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BY EDWARDS AND KELCEY, INC.
FOR THE NEW JERSEY DEPARTMENT OF TRANSPORTATION
AND THE CITY OF NEWARK

T-4001(3)

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CITY OF NEWARK

TOPICS

Prepared for
The New Jersey Department of Transportation
and
The City of Newark, New Jersey

in Cooperation with
The Federal Highway Administration
U. S. Department of Transportation

by

Edwards and Kelcey, Inc.
Engineers and Consultants

March, 1974

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- Federal Highway Administration, U.S. Department of Transportation
- Essex County Highway Department
- City of Newark
- Tri-State Regional Planning Commission.

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SUMMARY

This study has developed a TOPICS plan for the City of Newark, New Jersey. Many governmental agencies were contacted on the Region, State, County, and City level, to discuss the TOPICS program, learn of planned roadway improvements and obtain existing data. From these discussions, as well as a field reconnaissance of the study roadway system and analyses of accident and capacity problem locations, a list of the most critical locations needing improvement was prepared.

Traffic surveys were conducted by Edwards and Kelcey and City of Newark personnel to supplement existing information. These surveys included traffic volume counts, collection of accident data from the Newark Police Department files and from the New Jersey Department of Transportation, operational surveys and an inventory of existing traffic control devices and roadway conditions. Present and projected traffic flows were determined for the study roadway system. Improvement projects were developed to best benefit the entire system; therefore, only locations experiencing the most critical accident, capacity, or overall circulation conditions were included. The projects are classified in terms of travel corridors and detailed spot improvements. The spot improvement projects were locations particularly critical either within or outside the corridor projects, and were the subject of more detailed analysis.

Improvement plans were prepared for problem locations in Newark in two phases, early implementation for immediate approval and construction, and the remainder of the program to be implemented over the next 5 years.

The implementation plan was prepared including both intersection and corridor improvements, based upon a priority rating system and considerations for practical sequence and coordination of the various proposals. The cost of implementing the overall plan is estimated to be $5,300,000.

INTRODUCTION

THE TOPICS PROGRAM

In 1967 the Federal Government launched TOPICS--Traffic Operations Program to Increase Capacity and Safety, on an experimental basis. The program was designed to permit Federal financing of improvements to local streets that suffered from traffic congestion and high accident potential but that had been ineligible for Federal Aid. The Federal-Aid Highway Act of 1968 authorized funds of $200 million per year for the fiscal years 1970 and 1971 for TOPICS. Additional funds of $100 million per year for the fiscal years 1972 and 1973 were authorized by the Federal-Aid Highway Act of 1970.

Generally, TOPICS improvements should be within existing rights-of-way; however, additional rights-of-way may be acquired to widen intersections, eliminate jog-type intersections, and eliminate street discontinuities. The types of improvements eligible under the TOPICS program include:

1) intersection channelization,
2) widening of traffic lanes,
3) additional approach lanes at signalized intersections,
4) installation of control systems to make traffic signal operations more responsive to actual traffic conditions,
5) installation of traffic surveillance systems,
6) addition and upgrading of traffic signs and markings,
7) development of special use traffic lanes for trucks and buses,
8) improved roadway lighting,
9) changes in parking regulations to increase roadway capacity and safety,

10) construction of pedestrian grade separations or highway grade separations in special cases, and

11) construction or reconstruction of short roadway sections to provide continuity in the roadway system.

THE STUDY AREA

Located within 10 miles of New York City in Essex County, Newark is a significant hub of activity within the New York Metropolitan Area. Supporting a population of about 380,000, and servicing an urban area of over 1,800,000 (1970 Census SMSA), the City contains a central business district of regional importance, sizable industrial areas particularly in the meadowlands east of the New Jersey Turnpike, and diverse residential usage both in terms of quality and density. An unusually high influx of non-residents to work in the City makes Newark the most "commuted-to" major city in the United States for its size.*

The City is provided extensive rail commuter and freight connections for service to the New York-Northern New Jersey Metropolitan Area, western and southern New Jersey, and neighboring states. In addition, an intricate network of bus operations serves the City and is part of an overall intercity and interstate bus transit operation. A sizable network of interstate and other major highways also provides regional accessibility to and from Newark. Major routes include the Garden State Parkway, the New Jersey Turnpike, U.S. Routes 22, 1, and 9, New Jersey Route 21 and Routes I-280 and I-78, which is presently under construction.

In terms of local circulation, Newark is typical of an old city, with insufficient off-street parking facilities, very narrow streets on which pavement is of poor quality, close set back distances which restrict roadway widening, small corner radii, and antiquated control devices. As a result of these conditions, congestion and high accident frequency exist while general traffic circulation within the City suffers.

* The Brookings Institution reported that the daytime population of the City is more than twice the night-time population; Edwards and Kelcey - DeLeuw, Cather and Co., Newark Transportation Study (1961), page 1.

STUDY OBJECTIVES

The objective of this study was to develop a program of practical traffic operation improvements, capable of being:

- Realized within a relatively short time period;
- Maintained at the designed level of efficiency; and
- Coordinated with long-range transportation planning.

These improvements are planned to be constructed on a systematic basis to insure maximum effectiveness of benefits gained for money spent and are designed to result in smooth, efficient flow notable for reduction of hazards and excessive congestion. A harmonious balance between safety and capacity is required to achieve these optimized traffic operations in conjunction with the overall objective of maximizing both conditions. It is emphasized that this TOPICS study does not attempt to solve every existing traffic problem in Newark, but rather those conditions most critical in terms of traffic circulation and flow.

Evaluation of the existing roadway and control device system indicated that much of the improvement effort contained in the TOPICS Program in Newark would be concentrated in the modernization of an antiquated signal system. Efforts would also include improvement of numerous hazardous and inefficient intersection areas or the improvement of traffic flow characteristics on the major street system.

The specific objectives of these TOPICS improvements are:

- reduction of traffic congestion;
- facilitation of traffic flow; and
- reduction of the number and severity of traffic accidents.

STUDY DESIGN

THE NEWARK ROADWAY SYSTEM

Prior to the outset of the project, a study street network, as shown in Figure 1, was identified for investigation under the TOPICS studies. This network included major and collector streets and other streets with significant volumes or special operational concerns. The network thus identified served as the roadway system for all basic reconnaissance, traffic volume, and roadway inventory surveys. Appendix A presents a computerized summary of this network along with various significant facts pertaining to each of these roadway components.

Based upon field reconnaissance, analyses of present and projected traffic demands, and operational surveys conducted as part of the overall TOPICS studies, a recommended Federal-Aid Primary Type II roadway network was selected. This network consists of streets recommended for addition to the existing Federal-Aid roadway system to create a logical, connected network of metropolitan routes eligible for TOPICS improvements. Included in the Federal-Aid network are roadways of the recently designated Federal-Aid Urban System, which expanded upon the previous system of Federal-Aid Primary Type I and Federal-Aid Secondary routes in Newark. The recommended final road network of 100.8 miles, as shown on Figure 2*, includes:

70.1 Miles of Existing Federal-Aid Urban System
12.0 Miles of Existing Federal-Aid Primary Type I
18.7 Miles of proposed Federal-Aid Primary Type II System composed of:
- major and collector streets;
- portions of the street grid in the downtown area; and
- a limited street grid in other areas having significant concentrations of traffic

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* A small portion of the Urban System consisting mostly of Doremus Avenue (east of the New Jersey Turnpike) does not appear on Figure 2.

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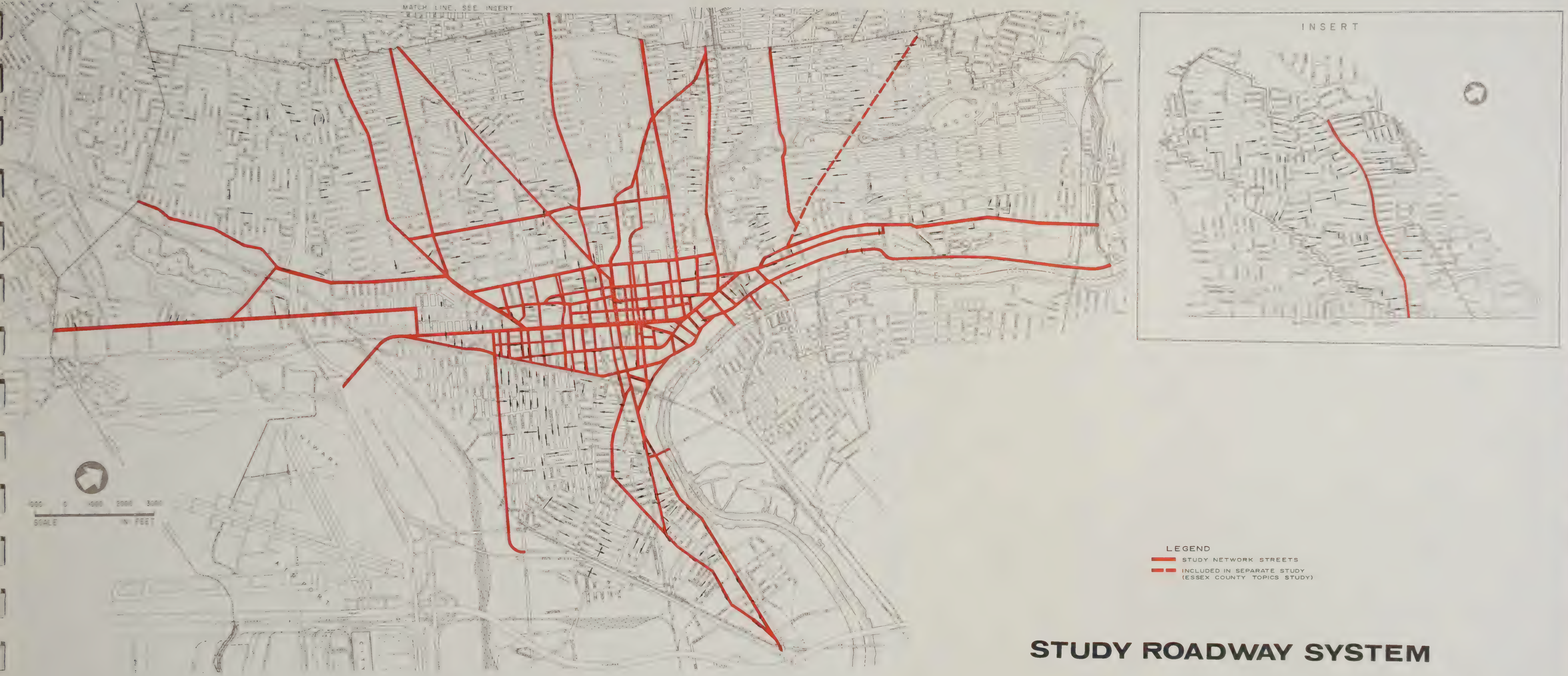

STUDY ROADWAY SYSTEM

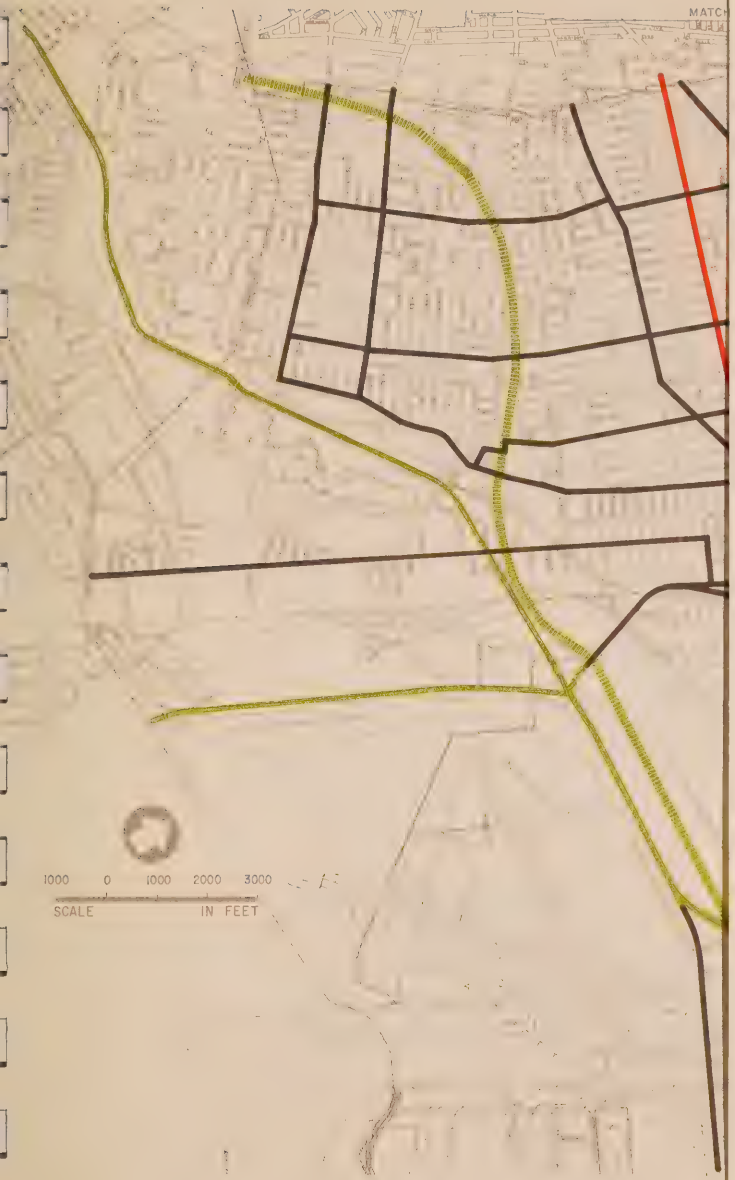
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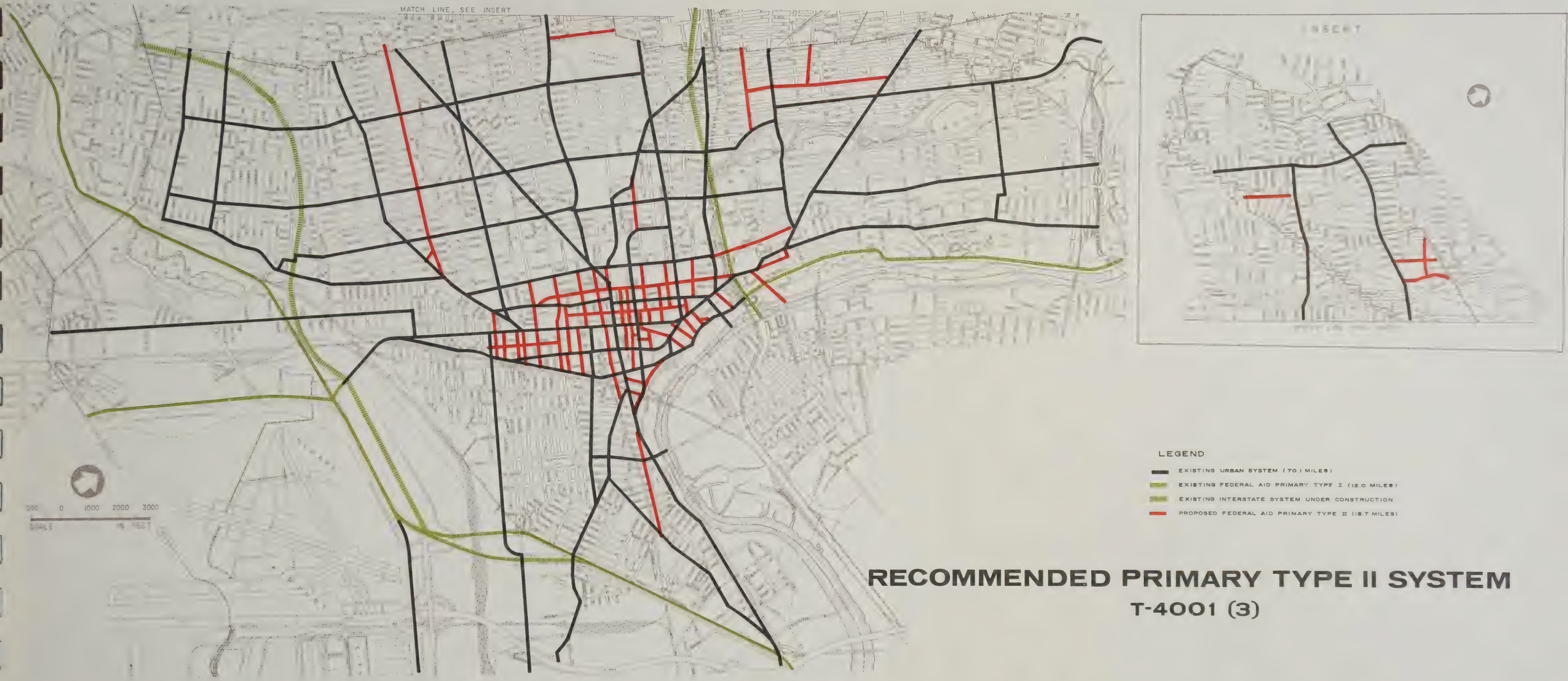
FIGURE 2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▬ EXISTING INTERSTATE SYSTEM UNDER CONSTRUCTION
▬ PROPOSED FEDERAL AID PRIMARY TYPE II (18.7 MILES)

RECOMMENDED PRIMARY TYPE II SYSTEM

T-4001 (3)

IDENTIFICATION OF PROBLEMS AND PROBLEM LOCATIONS

Meetings with Local Officials and Agencies

At the outset of the study, Edwards and Kelcey personnel met with representatives of the Newark Planning Department, Public Works and Police Departments to discuss traffic operations and problems in the City. Also, meetings were held with the Essex County Traffic Engineer, Transport of New Jersey (the major bus carrier in the City), and with the Model Cities Planning Agency (Community Development Administration). Among the items covered were previously developed but unimplemented improvement plans, coordination of TOPICS with other ongoing improvement programs, specific accident and congestion problems, and areas of immediate public concern as perceived by the representatives. Specific locations of concern were noted for investigation during the reconnaissance and operational survey segments of the TOPICS studies.

Accidents

Available data concerning the number of accidents reported during the period 1969 through 1971 were compiled from the Newark Police Department files by City personnel. Locations exhibiting high concentrations of total accident occurrences (16 or more) over the three-year period are identified on Figure 3, and the locations experiencing the greatest accident frequency on the study network were selected for additional data collection and investigation.

Reconnaissance Surveys

Reconnaissance surveys were conducted on the study roadway network to verify by field observation which roadways should be included in the Federal-Aid System, and more important, to uncover potential TOPICS improvement locations. The surveys were conducted during the morning and evening periods of peak traffic. Observations included identification of hazardous intersections, congestion caused by inadequate roadway and intersection capacity, apparent inadequacies in traffic signals, signs and markings, and the absence of adequate curbs, shoulders, and sidewalks. Potential problem locations were identified and, in some cases, possible TOPICS improvements were indicated.

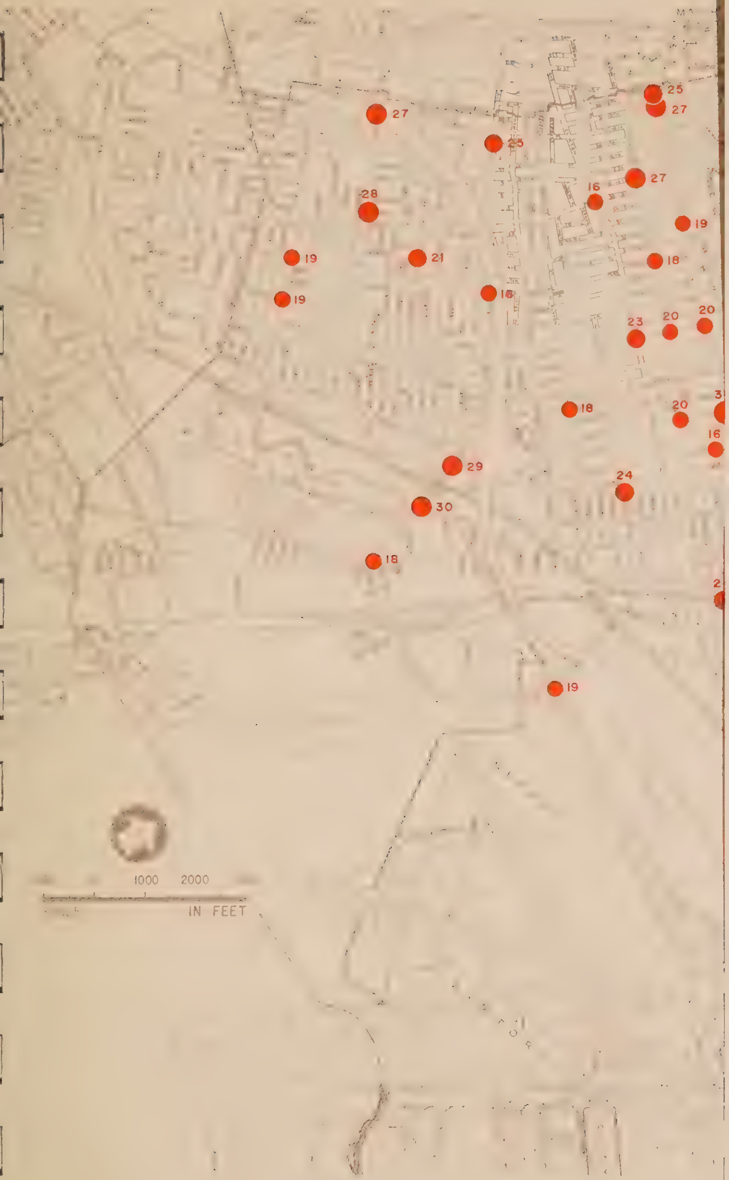
Travel Time Studies

Travel time studies were programmed for the major study system roadways to determine significant points of traffic delay. Actual speed and delay runs were not conducted as part of this study in view of the areawide transit strike which was in progress at the time. Instead, travel time studies conducted in a previous project during 1968 and 1969 were utilized to determine system needs. This previous project was NCHRP Project 3-14 leading to the preparation of Highway Research Board Report No. 113: "Optimizing Flow on Existing Street Networks" by Edwards and Kelcey.

For the portion of Newark falling outside of the HRB Study influence area, field reconnaissance by Edwards and Kelcey personnel was utilized for ascertainment and subsequent tabulation of major delay points.

Selection of Study Locations

The aforementioned analyses formed the basis for selection of those locations experiencing the most critical traffic operations problems. Selected "Study" locations were listed for more detailed data collection and are depicted on Figure 4.



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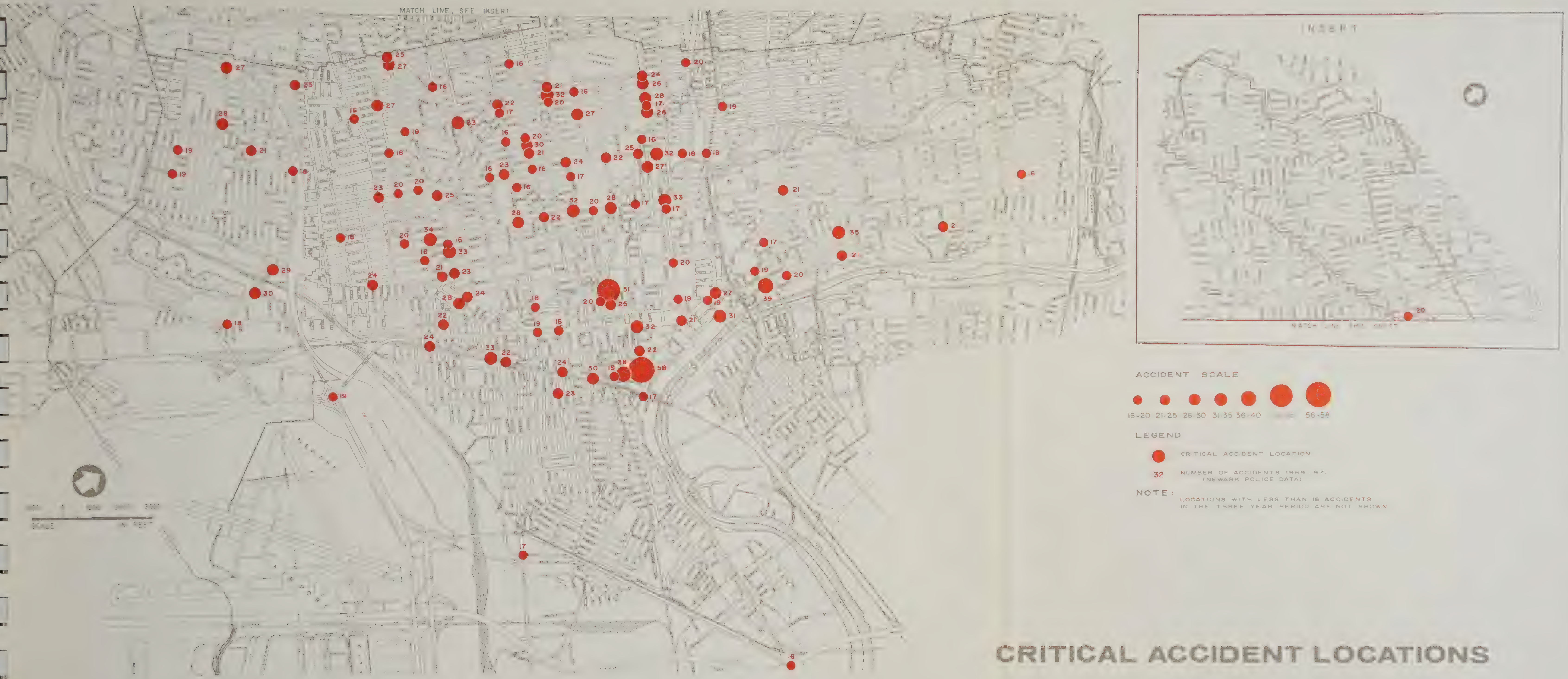
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ACCIDENT SCALE
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31-35
36-40
56-58
LEGEND
● CRITICAL ACCIDENT LOCATION
32 NUMBER OF ACCIDENTS 1969-971 (NEWARK POLICE DATA)
NOTE: LOCATIONS WITH LESS THAN 16 ACCIDENTS IN THE THREE YEAR PERIOD ARE NOT SHOWN

CRITICAL ACCIDENT LOCATIONS
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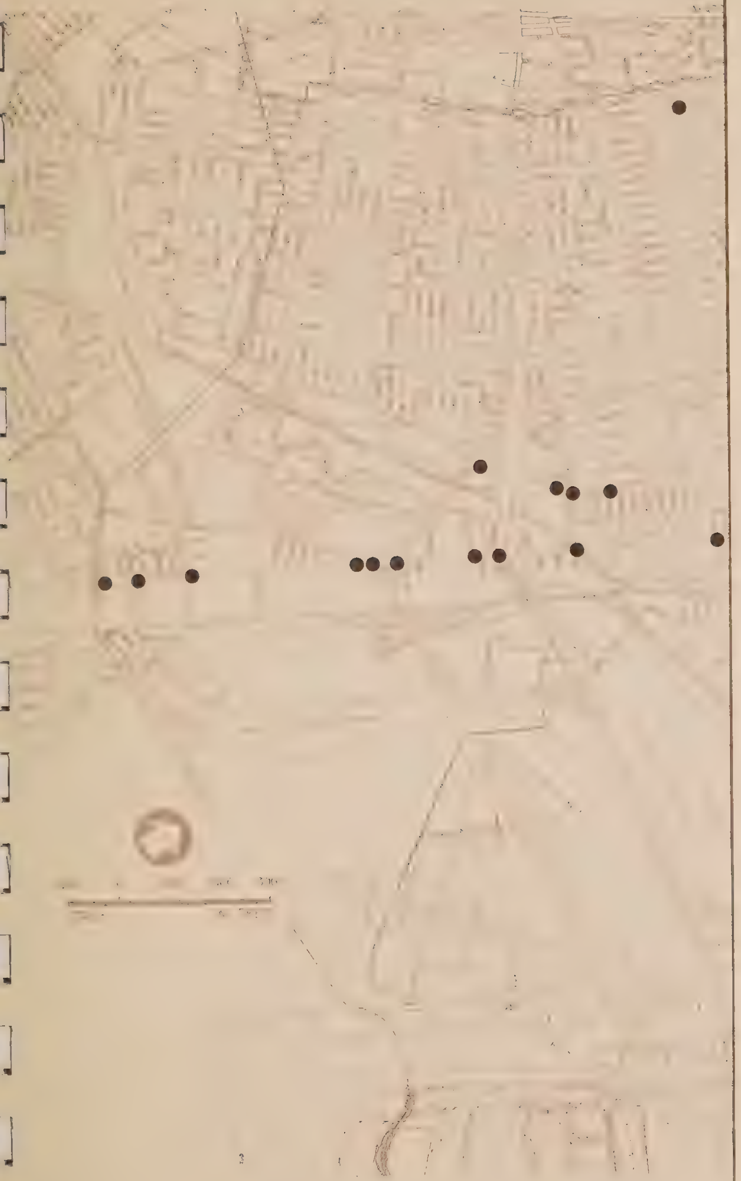
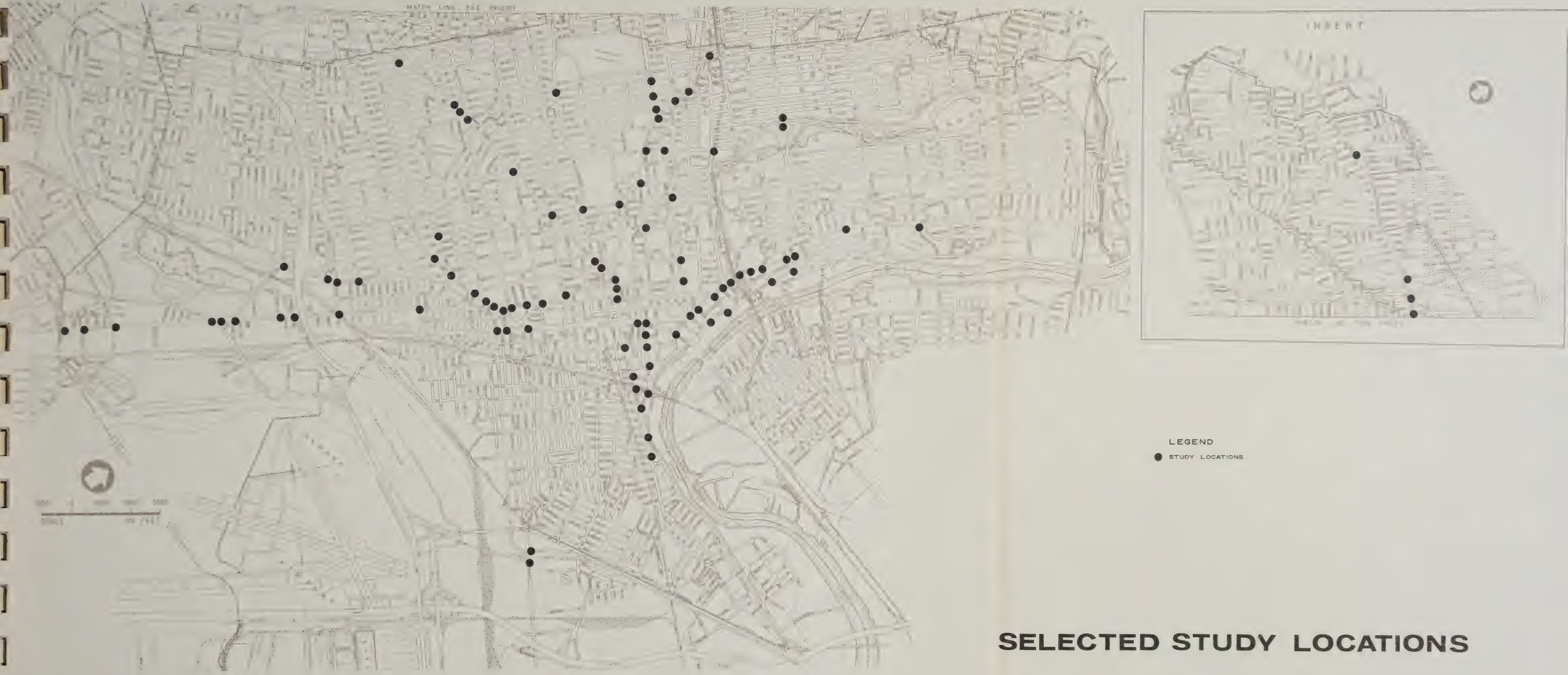




SELECTED STUDY LOCATIONS

DATA COLLECTION AND ANALYSIS

DATA SOURCES

Available Records

Data assembled from files of the Newark Planning Board and office of the City Engineer and that obtained during preparation of the Highway Research Board Report 113 - "Optimizing Flow on Existing Street Networks" by Edwards and Kelcey, provided background information on the roadway and public transportation network, and related improvement proposals. These data included street maps, street and right-of-way widths, traffic signal equipment records, bus route maps and scheduling, traffic and parking ordinances and miscellaneous data on existing street and parking facilities. Newark Police Department records and those compiled by the State of New Jersey served as the sources for accident data.

The Essex County Highway Department, through its County Traffic Engineer, provided additional data including traffic volume records and insight into traffic operational considerations for Newark in relation to the County.

Data from the following permanent traffic counting stations in or near the study area were supplied by the New Jersey Department of Transportation for use in developing traffic growth projections:

- Grove Street south of Central Avenue
- Route 21 (McCarter Highway) Northbound approaching Poinier Street
- Stickel Bridge (I-280) Westbound
- Park Avenue between Ninth and Eleventh Streets Westbound.

Supplementary Surveys

Field surveys to supplement the file data were conducted by the Bureau of Traffic and Signals under supervision of Edwards and Kelcey personnel. The surveys included inventories of roadway conditions, signing and marking on the study system and the location of all traffic signal installations. City personnel conducted tape surveys of study intersections and performed manual vehicle turning movement counts, pedestrian counts and Automatic Traffic Recorder (ATR) counts. Additional field work such as operational studies was undertaken by the consultant.

TRAFFIC FLOW

Traffic flow on the study roadway system was determined on an average basis for monthly, daily and hourly volumes. Analysis involved formulation of factors which could be applied to actual recorded volumes to arrive at totals reflective of average conditions. Monthly factors were determined from 1972 counts at the four state-operated locations. Results shown in Table 1 illustrate that May, June, and September were months experiencing the greatest traffic volumes while Christmas shoppers also caused gains in volume during December. During July, volumes reached their lowest point, undoubtedly resulting from school closings and vacations.

TABLE 1

MONTHLY TRAFFIC VARIATION (% OF AVERAGE MONTHLY TRAFFIC)

January	96.2	July	93.8
February	97.1	August	98.3
March	99.2	September	107.6
April	99.5	October	99.2
May	105.1	November	98.8
June	108.8	December	102.1

Traffic flow maps were prepared for the study roadway system, indicating estimated average weekday traffic for 1975. The flow maps were developed from traffic volume data collected for this project and for the Highway Research Board Project 3-14 along with traffic counts provided by the Essex County Highway Department. Adjustment factors used to develop average weekday volumes were based on Automatic Traffic Recorder (ATR) counts taken in connection with the TOPICS Study at the following locations:

- Central Avenue between High Street and University Avenue
- Springfield Avenue between Market Street and Thirteenth Avenue
- Broad Street between Chestnut and Kinney Streets.

Data from these locations indicated only minor daily variations in traffic on weekdays, with heaviest total volumes generally occurring on Wednesday and Friday. Daily variations, expressed as a percentage of Average Weekday Traffic (AWDT) are summarized in Table 2.

TABLE 2

DAILY TRAFFIC VARIATIONS

Day of Week	Percent of AWDT
Monday	95
Tuesday	97
Wednesday	102
Thursday	101
Friday	105

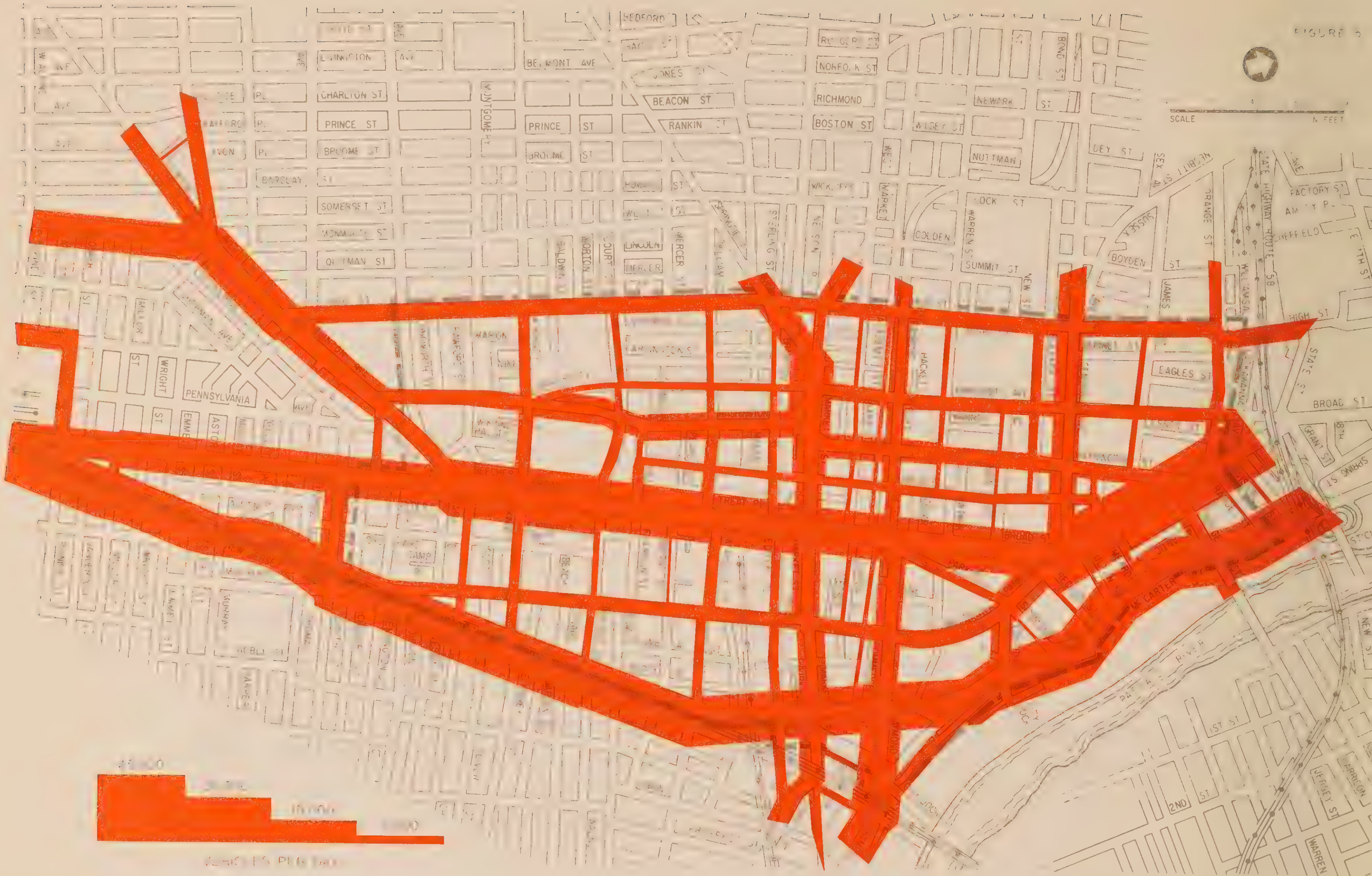
Table 3 illustrates the hourly variation of traffic flow derived from the same stations as the daily variation. Peak traffic periods are between 7-9 A.M. and 4-6 P.M.

TABLE 3

HOURLY TRAFFIC VARIATION (% OF 24 HOUR VOLUME)

12 - 1 A.M.	1.8	12 - 1 P.M.	5.1
1 - 2	1.1	1 - 2	5.4
2 - 3	0.9	2 - 3	5.3
3 - 4	0.6	3 - 4	6.5
4 - 5	0.7	4 - 5	7.5
5 - 6	1.6	5 - 6	7.1
6 - 7	4.1	6 - 7	5.2
7 - 8	6.6	7 - 8	4.2
8 - 9	7.4	8 - 9	3.8
9 - 10	5.7	9 - 10	3.4
10 - 11	5.3	10 - 11	2.9
11 - 12	5.4	11 - 12	2.5

An estimate of average weekday traffic flow for the year 1975 was derived using the existing 1972 traffic counts and an overall annual growth rate of 0.8% for the inner area of the City and 1.75% for the remainder of the City. The inner area growth rate was determined during the HRB Study while the latter rate was formulated from counts received from the New Jersey Department of Transportation. Figures 5 and 6 illustrate the estimated 1975 volumes for the study system.



1975 AVERAGE WEEKDAY TRAFFIC

INNER AREA

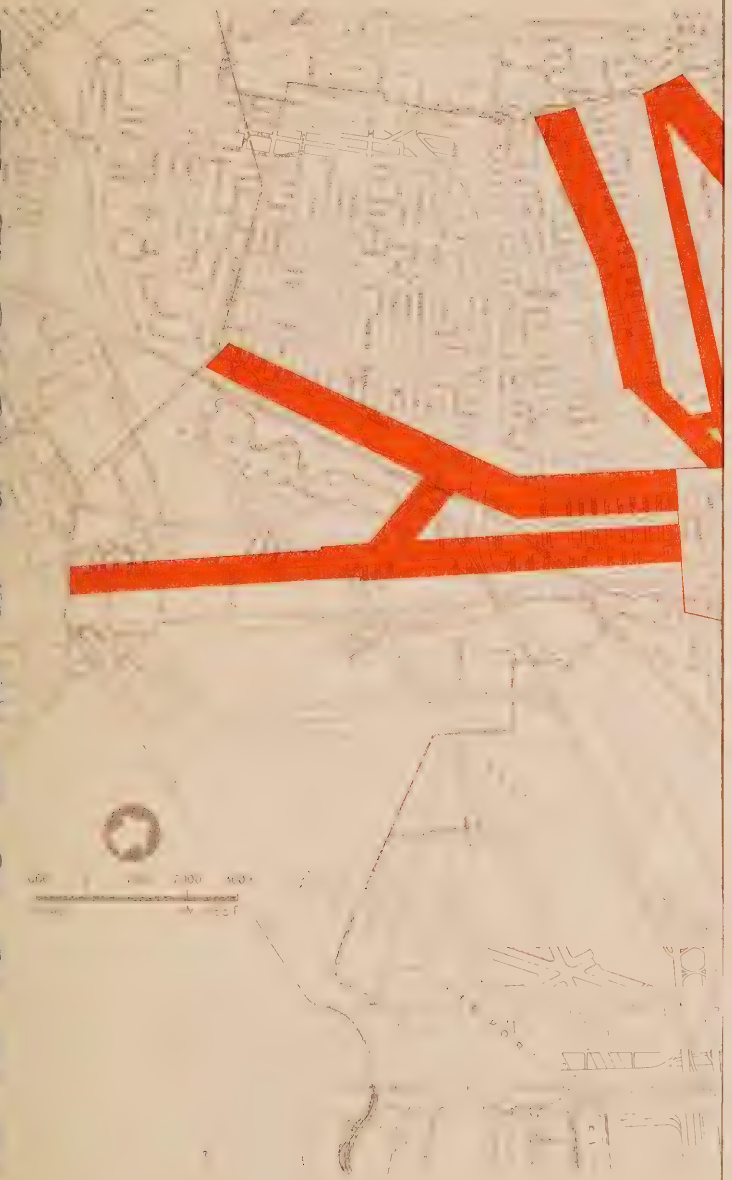
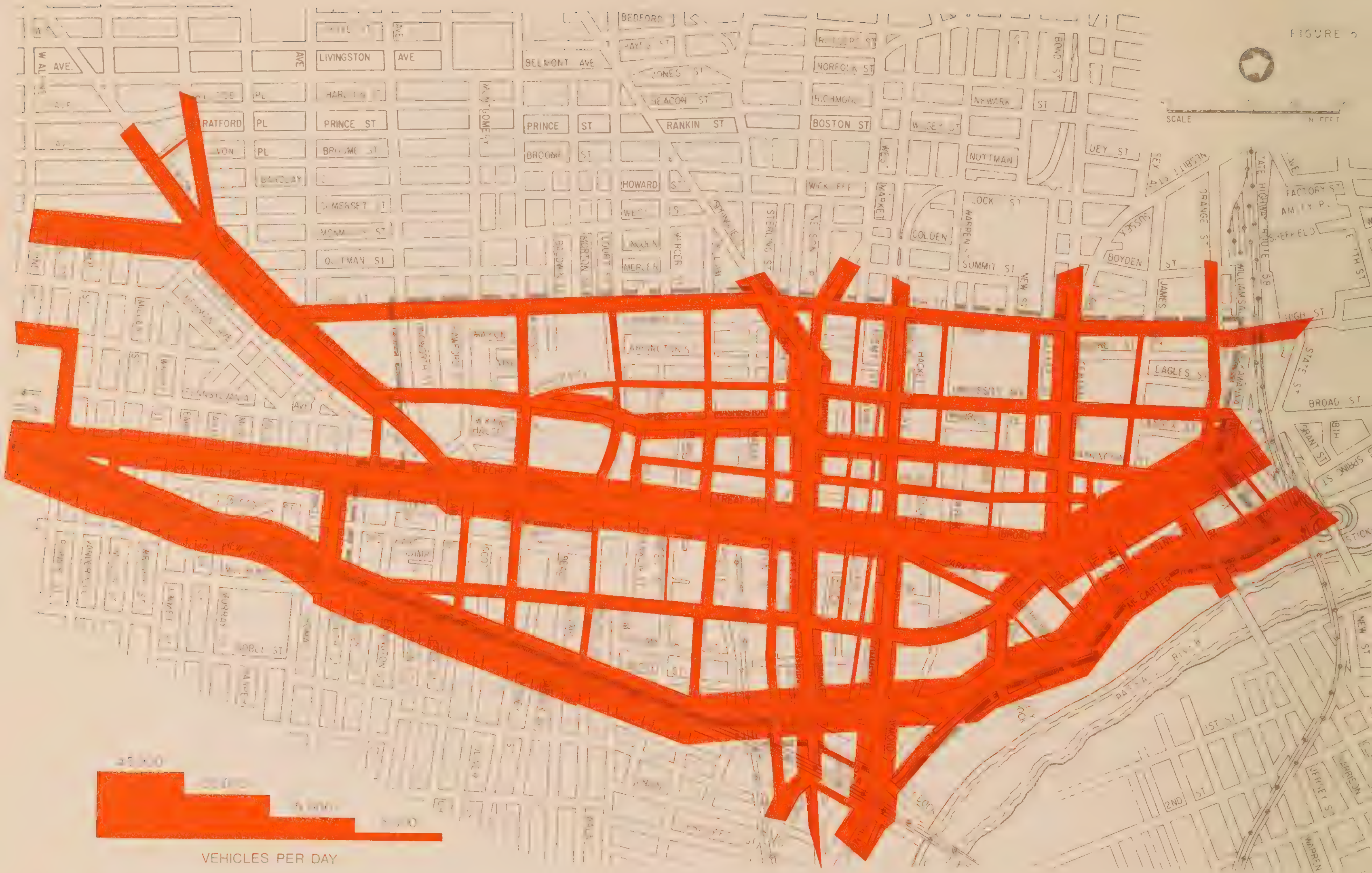
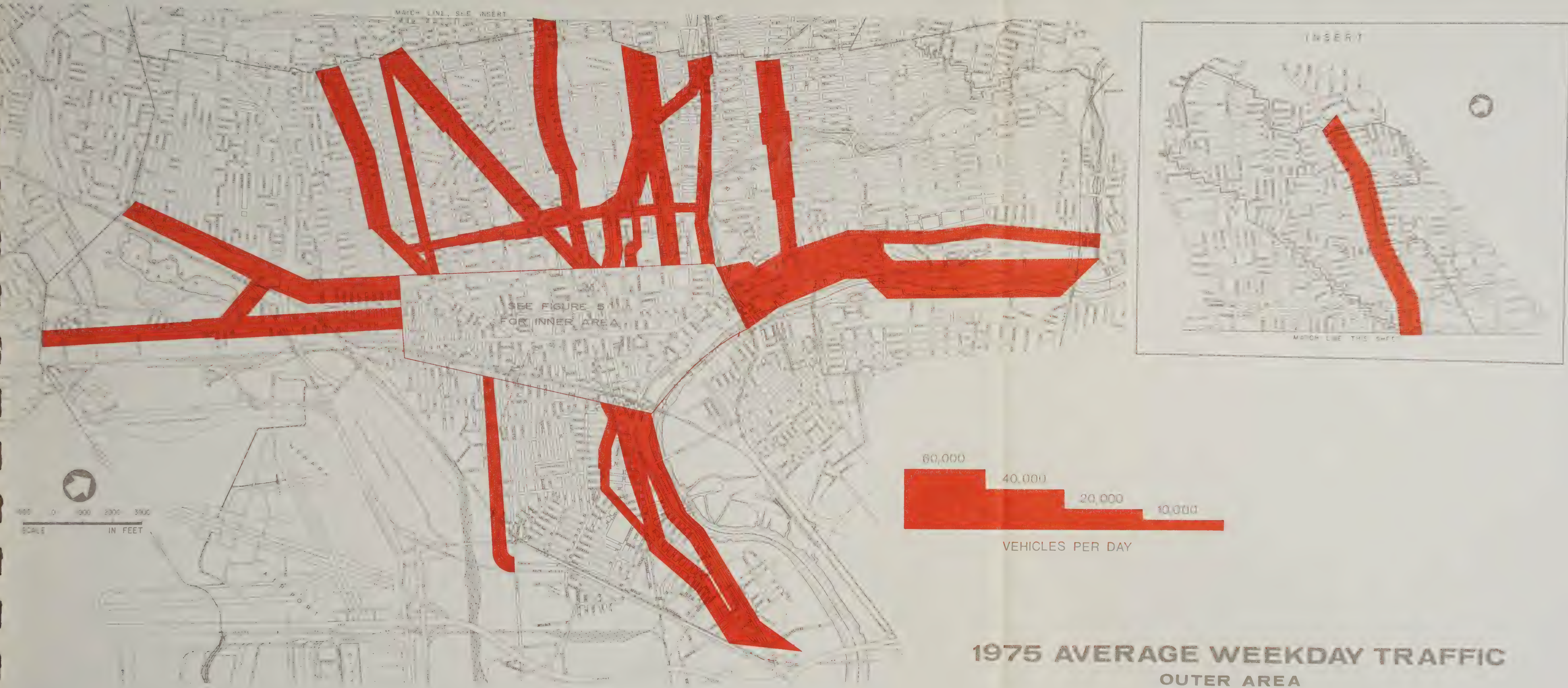


FIGURE 5



1975 AVERAGE WEEKDAY TRAFFIC

INNER AREA



1975 AVERAGE WEEKDAY TRAFFIC
OUTER AREA

ACCIDENT ANALYSIS

Data for all accidents reported during 1969, 1970 and 1971 were studied from computer print-outs furnished by the City to assist Edwards and Kelcey personnel in the selection of each study location during the operational field investigations. City-compiled data did not include reports on all accidents; therefore, accident information furnished by the State was used for the more detailed accident analysis. State data included not only Newark Police reports but also reports submitted by individual motorists as required by law for accidents involving property damages in excess of $200.00. These motorist-submitted reports approximately doubled the amount of pertinent data. State-furnished data also proved to be very valuable in the preparation of collision diagrams and for detailed analysis of the existing traffic hazards at each of the improvement locations.

The number of accidents per capita of Newark was compared with other major population centers in New Jersey. As shown in Table 4, Newark has experienced a greater number of accidents per 1000 population than its counterparts.

TABLE 4

COMPARATIVE MUNICIPAL ACCIDENT STATISTICS

City	Population (1970)	Total Accidents (1970)	Accidents/1000 Population
Newark	378,222	13,678	36.2
Camden	102,551	2,303	22.5
Jersey City	260,545	5,523	21.2
Trenton	104,638	3,002	28.7
Paterson	144,824	3,052	21.1
Elizabeth	112,654	3,431	30.4

Source: New Jersey Department of Transportation.

CAPACITY ANALYSIS

The nature of the urban street pattern is such that intersection capacities, (where flows on one street must be interrupted while flows on the cross street move) generally are the controlling factor. Therefore, analyses were performed at study intersections selected from accident data, meetings with local officials and the reconnaissance survey to determine capacity deficiencies. There studies, undertaken in compliance with the 1965 HIGHWAY CAPACITY MANUAL*, identified the most serious locations as depicted on Figure 7.

Roadway capacity is measured in terms of levels of service according to standards developed in the 1965 HIGHWAY CAPACITY MANUAL. The maximum possible capacity is considered to be Level of Service E. However, since traffic flow at Level E is very unstable, it is customary to design improvements within urban areas to achieve the standards for Level of Service C, (although Level D was accepted for designing where necessary due to the difficulty or expense of achieving Level C). Thus, Level C was used as the standard for evaluating improvement needs in Newark.

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*Highway Research Board, HIGHWAY CAPACITY MANUAL 1965 (Highway Research Board Special Report 87), Washington, D.C., 1965.

OTHER TRAFFIC INFLUENCES

Roadway Characteristics

Base maps depicting the existing physical conditions of all TOPICS Study locations were prepared utilizing 1" = 20' scale plans of subsurface structures obtained from the Newark Department of Public Works. Supplemental field information for these locations gathered by City of Newark and Edwards and Kelcey personnel included the type and condition of the roadways and the location and condition of all traffic signals, traffic signs, posted parking regulations, width of sidewalks, as well as public utilities, drainage structures, fire hydrants and all other appurtenances that may be affected by the proposed improvement of the intersection.

Control Devices

Warrant requirements were investigated for all signalized intersections included in the TOPICS improvement program (the CBD system and major arterials). Manual turning movement counts and/or ATR counts were used to evaluate the acceptability of each location for State approval as required by Title 39 of the revised Statutes. The locations of warranted and unwarranted signals as well as recommendations regarding new signal locations are described in the "Improvement Program" section of this report.

Also included in this inventory were compliance checks of all signalized intersections noted above to evaluate their degree of adherence to requirements of the Manual on Uniform Traffic Control Devices. These checks were conducted of traffic control signals (lenses per face, visibility of face, number of faces, etc.); pedestrian signals (location, design requirements, etc.) and signs and markings located at or near each signalized intersection.

D

OTHER TRAFFIC INFLUENCES

Roadway Characteristics

Base maps depicting the existing physical conditions of all TOPICS Study locations were prepared utilizing 1" = 20' scale plans of subsurface structures obtained from the Newark Department of Public Works. Supplemental field information for these locations gathered by City of Newark and Edwards and Kelcey personnel included the type and condition of the roadways and the location and condition of all traffic signals, traffic signs, posted parking regulations, width of sidewalks, as well as public utilities, drainage structures, fire hydrants and all other appurtenances that may be affected by the proposed improvement of the intersection.

Control Devices

Warrant requirements were investigated for all signalized intersections included in the TOPICS improvement program (the CBD system and major arterials). Manual turning movement counts and/or ATR counts were used to evaluate the acceptability of each location for State approval as required by Title 39 of the revised Statutes. The locations of warranted and unwarranted signals as well as recommendations regarding new signal locations are described in the "Improvement Program" section of this report.

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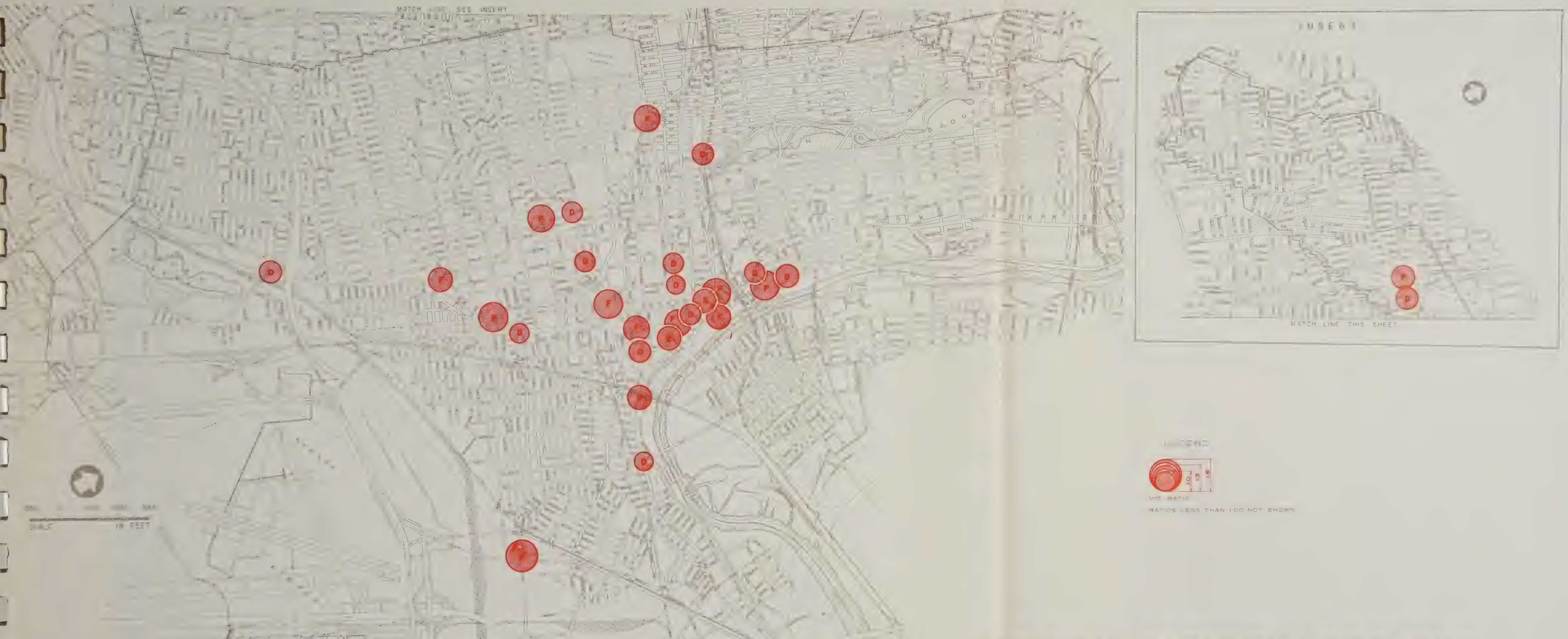


CRITICAL CAPACITY LOCATIONS

Operational Surveys

Operational surveys were performed for all study locations and for the corridor improvement projects. The survey was conducted concurrently with the manual turning movement counts and with the inventory of traffic control devices and included observations of traffic signal operations, delays to through traffic caused by turning vehicles, congestion, parking characteristics near the intersection, pedestrian movements, the presence or absence of police officers directing traffic, bus stops, loading zones, one-way street patterns, safety hazards, and any other pertinent information that could aid the traffic engineer in his analysis of the problem.

Parking Studies

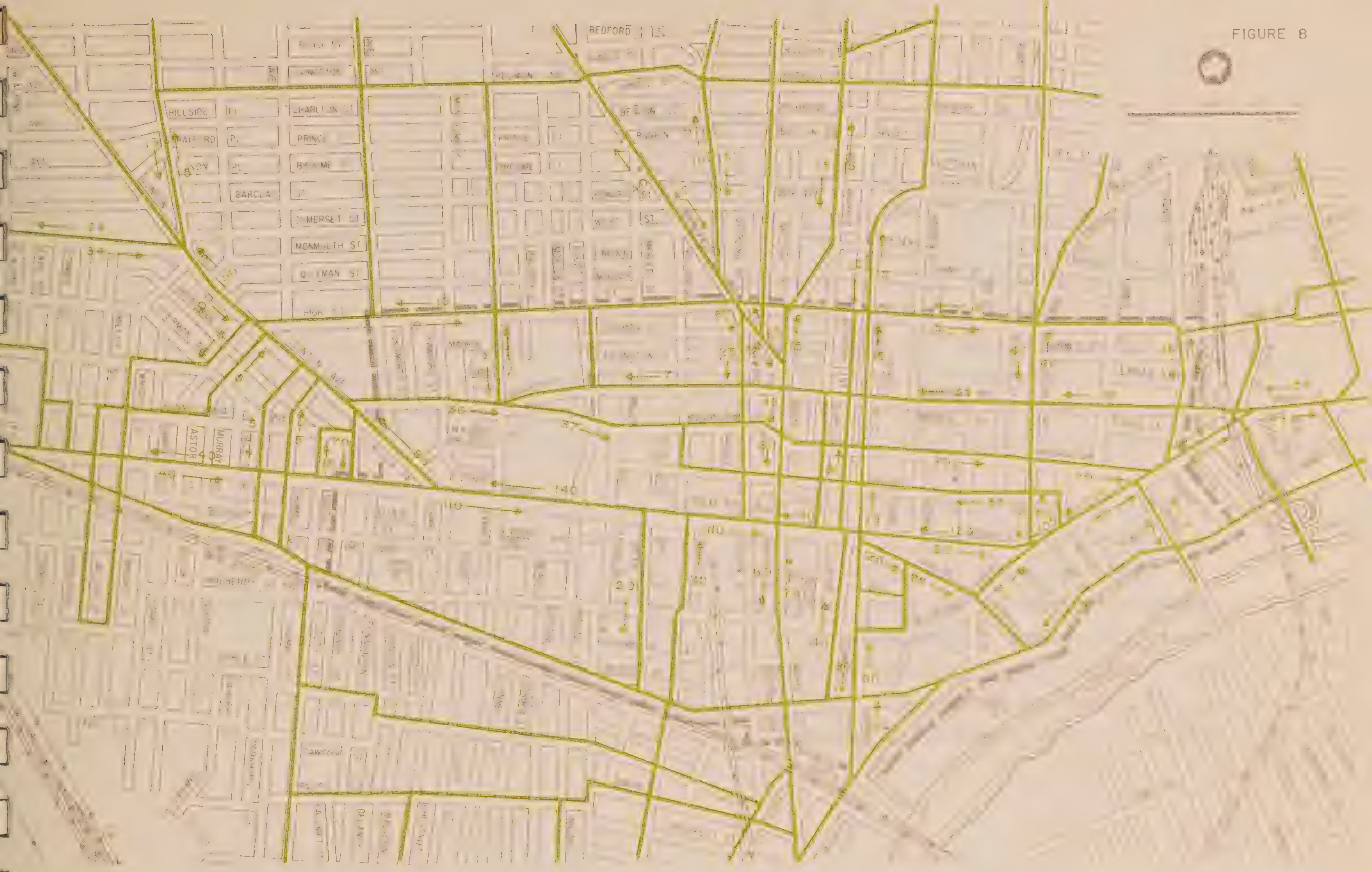
Field inspection of existing parking regulations and conditions were undertaken in conjunction with the operational surveys. Emphasis was placed on those corridors and intersections selected for improvement under the TOPICS program. Specific recommendations for any changes in existing parking conditions are included in the "Improvement Program" section of this report, while overall parking guidelines are presented in terms of "regulations and enforcement" under the appropriate chapter.

TRANSIT FACILITIES

Newark is served by extensive rail and bus facilities. Passenger rail service centered around Pennsylvania Station in the eastern sector of the CBD is provided primarily by AMTRAK (Metroliner), the Jersey Central Railroad, Penn Central Railroad and Port Authority Trans-Hudson. Erie-Lackawanna commuter service operates through the Erie-Lackawanna Station in the northern sector of the CBD. Commuter service is also provided from northern Newark and Belleville to the CBD via the Newark City Subway. Freight yards located at various sites in the City offer convenient access to warehouses and processing plants.

Bus routes serve most parts of Newark with the greatest concentrations within and on the periphery of the Central Business District. In view of the large magnitude of buses using these routes, their impact upon traffic circulation and overall system operation must be considered a significant part of any improvement design. Bus routes and typical volumes on major transit thoroughfares in the inner area of the City are shown in Figure 8, and bus volumes on the remainder of the study network appear on Figure 9. Volumes shown in these figures represent conditions just prior to the transit strike which lasted from February 28 to May 15, 1972. Following the strike, there has been a significant period of contraction of bus ridership, routes and schedules.

FIGURE 8



EXISTING BUS ROUTES

INNER AREA

LEGEND

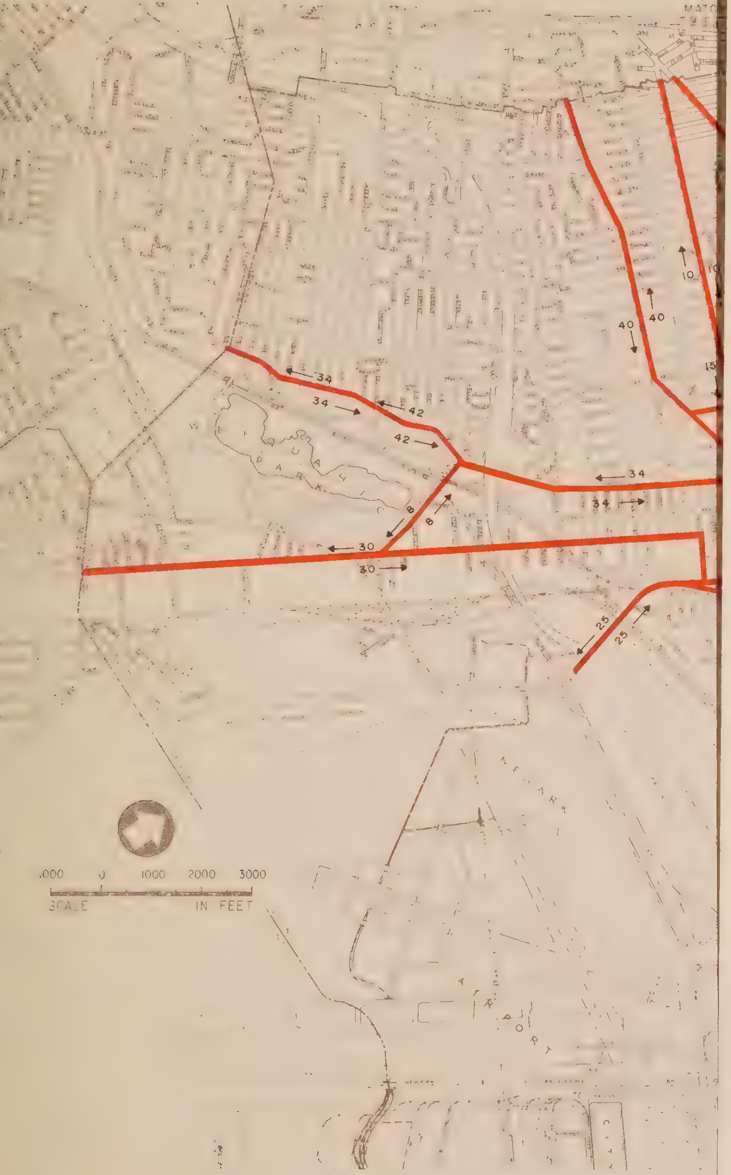
BUS ROUTES

NUMBER OF BUSES PER HOUR BY DIRECTION PM PEAK

AIRPORT ACCESS

As befits a major hub of activity in the New York Metropolitan Area, air transportation is a critical element in the livelihood of the City. Several airport facilities service the City, in particular Newark Airport, as well as La Guardia Airport and Kennedy International Airport, which possesses customs facilities to accommodate international flights and adequate terminals to handle passenger loads created by the wide-body jets of the 747 and DC-10 variety. An extensive improvement program is now in progress to enlarge present Newark Airport operations. Construction of new expanded terminals undoubtedly will generate increased air passenger and freight volumes and equip the airport with the facilities necessary to improve domestic service as well as operate on an international level.

This expansion program will create significant ramifications in terms of access to and from the airport. Since McCarter Highway and Route 1 and 9, the primary arteries from points north and south, are already inadequate to cope with the ever-increasing number of vehicles, a major intercahnge is under construction between these routes and Route I-78 in the airport area. A general improvement of highways and access in the vicinity of the new terminal is also being made. Future plans also include an extension of the Port Authority Trans-Hudson system (PATH) to the airport and points beyond. In addition, feasibility studies to improve the McCarter Highway corridor between the CBD and Newark Airport are being considered.

MATC
34
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WEQUAHIC PARK
NEWARK AIRPORT
CITY
1000 0 1000 2000 3000
SCALE IN FEET

AIRPORT ACCESS

As befits a major hub of activity in the New York Metropolitan Area, air transportation is a critical element in the livelihood of the City. Several airport facilities service the City, in particular Newark Airport, as well as La Guardia Airport and Kennedy International Airport, which possesses customs facilities to accommodate international flights and adequate terminals to handle passenger loads created by the wide-body jets of the 747 and DC-10 variety. An extensive improvement program is now in progress to enlarge present Newark Airport operations. Construction of new expanded terminals undoubtedly will generate increased air passenger and freight volumes and equip the airport with the facilities necessary to improve domestic service as well as operate on an international level.

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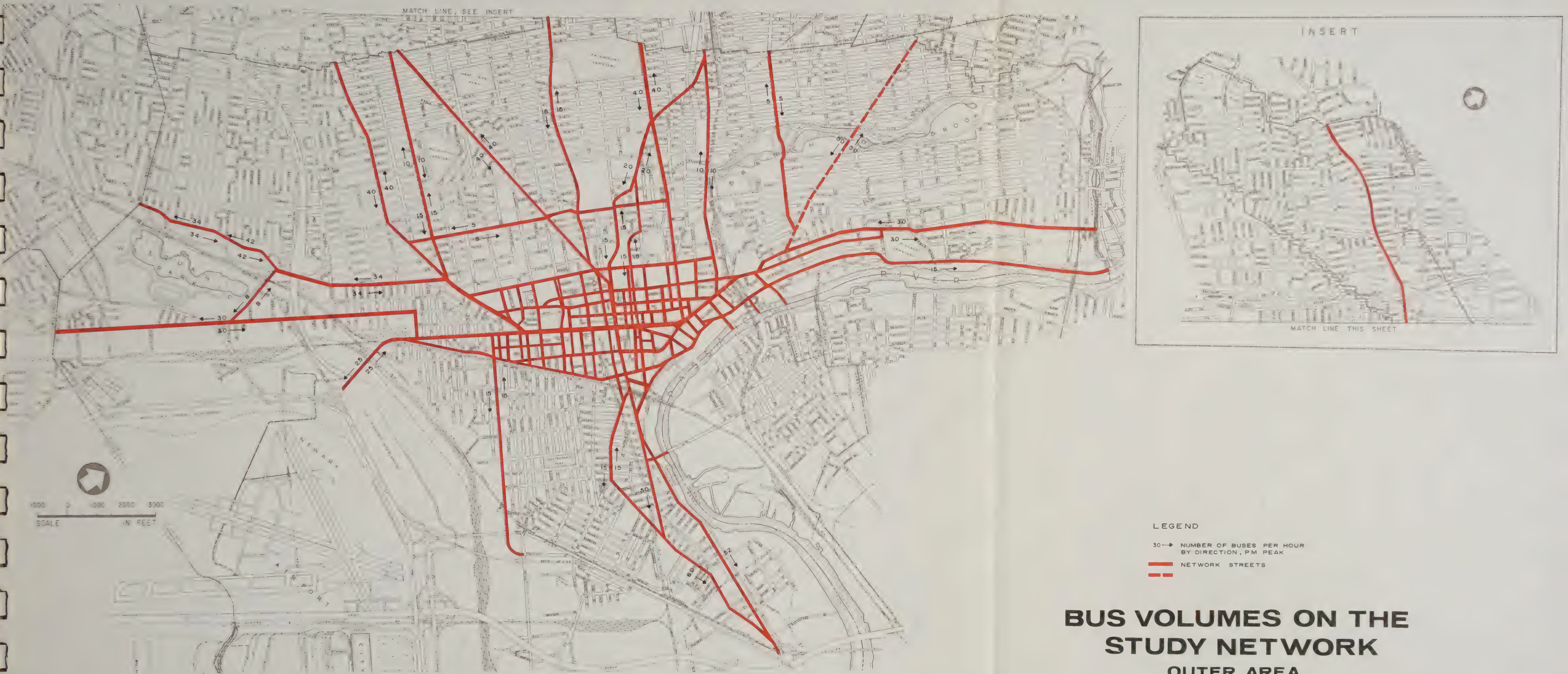
FIGURE 9



BUS VOLUMES ON THE STUDY NETWORK

OUTER AREA

IMPROVEMENT PROGRAM

PROGRAM DEVELOPMENT

Projects scheduled for early implementation were preselected for analysis and design. Data regarding these critical sites had been obtained during the HRB Study and were updated to reflect existing conditions. Identification of all other problem locations began with an overall study of the TOPICS roadway system, including investigation of traffic volumes and resultant capacity, as well as safety conditions experienced. From these criteria and observation of general circulation and traffic flow, a list of specific intersections was established for more detailed data collection as shown in Figure 4.

A set of priority indicators were then established to be used as guidelines to select those areas most critical for improvement under TOPICS. Determination of these improvement locations took into account both capacity and safety ratings for each study location as well as engineering judgement regarding the most effective improvements which could be undertaken under TOPICS. The study program was also developed with due concern for the overall Newark roadway system.

Improvement projects were classified in terms of travel corridors and detailed spot improvements. These latter projects, composed primarily of signalized intersections, were located either within the corridors selected or at other isolated sites within the City. The corridors selected for roadway improvements received a detailed traffic engineering analysis and functional plans of proposed improvements were prepared. These and other corridors were also selected to be in a program for coordination, upgrading and modernization of signals. All signal locations proposed for coordination and modernization were inspected for compliance with the 1971 Manual on Uniform Traffic Control Devices (MUTCD) requirements and inadequacies noted for correction. The location of roadway improvements including reversible travel operations is shown on Figure 10 while the location of proposed signal system improvements appear in Figure 11.

TRAFFIC SIGNAL APPROVALS

For analysis purposes, it was assumed at the outset of this study that all existing signals in Newark were unauthorized. Each location involved in the TOPICS improvement program was investigated with the aid of traffic counts and field inspections of site conditions to determine qualification for State authorization and approval as required by Title 39 of the Revised Statutes. It was determined if traffic signal warrant requirements were met (warrant requirements are listed in Appendix B) as well as other requirements of State regulations including standards set forth in the 1971 Manual on Uniform Traffic Control Devices (MUTCD). The status of each existing signal location in the signal system improvement program and the signal warrant satisfied for each location are summarized in Figures 12-17. Many of the warranted signals require modernization to meet MUTCD standards and to qualify for State approval.

The proposals presented in this report will meet State and MUTCD requirements at each of the signalized improvement locations. At warranted signal locations not included in the roadway improvement program, a compliance check has been carried out to identify minor signing and marking improvements as well as signal improvements, which are recommended for implementation under the TOPICS program as necessary to satisfy State and MUTCD standards.

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TRAFFIC SIGNAL APPROVALS

For analysis purposes, it was assumed at the outset of this study that all existing signals in Newark were unauthorized. Each location involved in the TOPICS improvement program was investigated with the aid of traffic counts and field inspections of site conditions to determine qualification for State authorization and approval as required by Title 39 of the Revised Statutes. It was determined if traffic signal warrant requirements were met (warrant requirements are listed in Appendix B) as well as other requirements of State regulations including standards set forth in the 1971 Manual on Uniform Traffic Control Devices (MUTCD). The status of each existing signal location in the signal system improvement program and the signal warrant satisfied for each location are summarized in Figures 12-17. Many of the warranted signals require modernization to meet MUTCD standards and to qualify for State approval.

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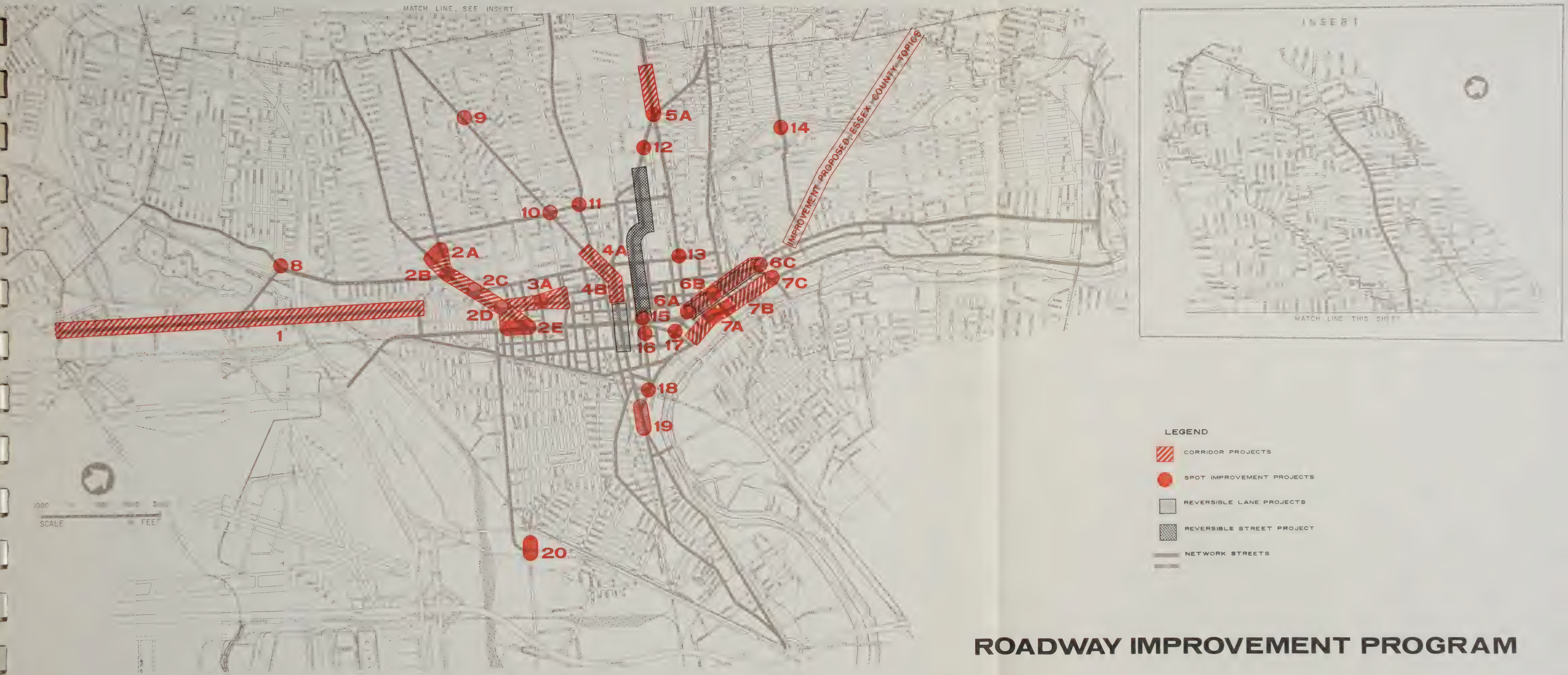
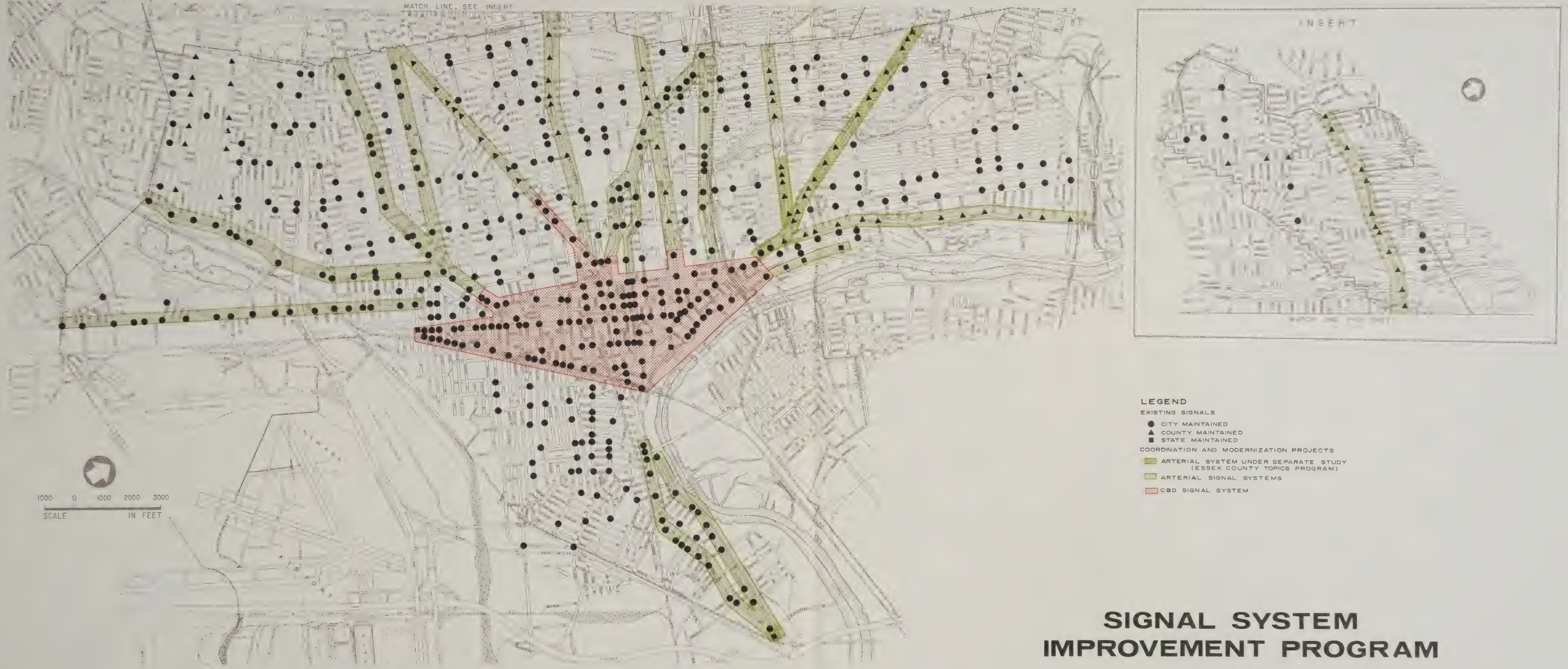
FIGURE 10

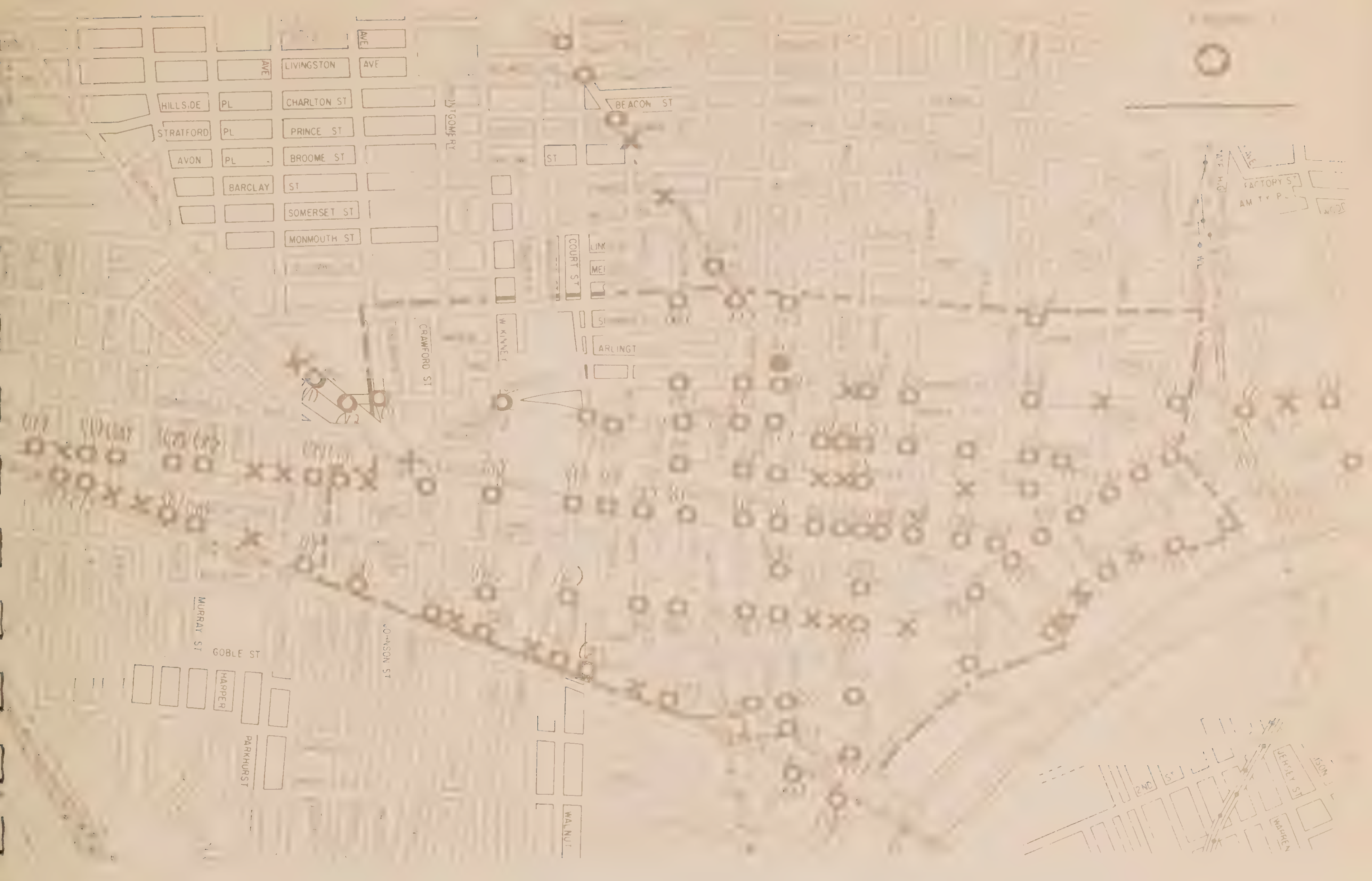


ROADWAY IMPROVEMENT PROGRAM

FIGURE 11



SIGNAL SYSTEM IMPROVEMENT PROGRAM

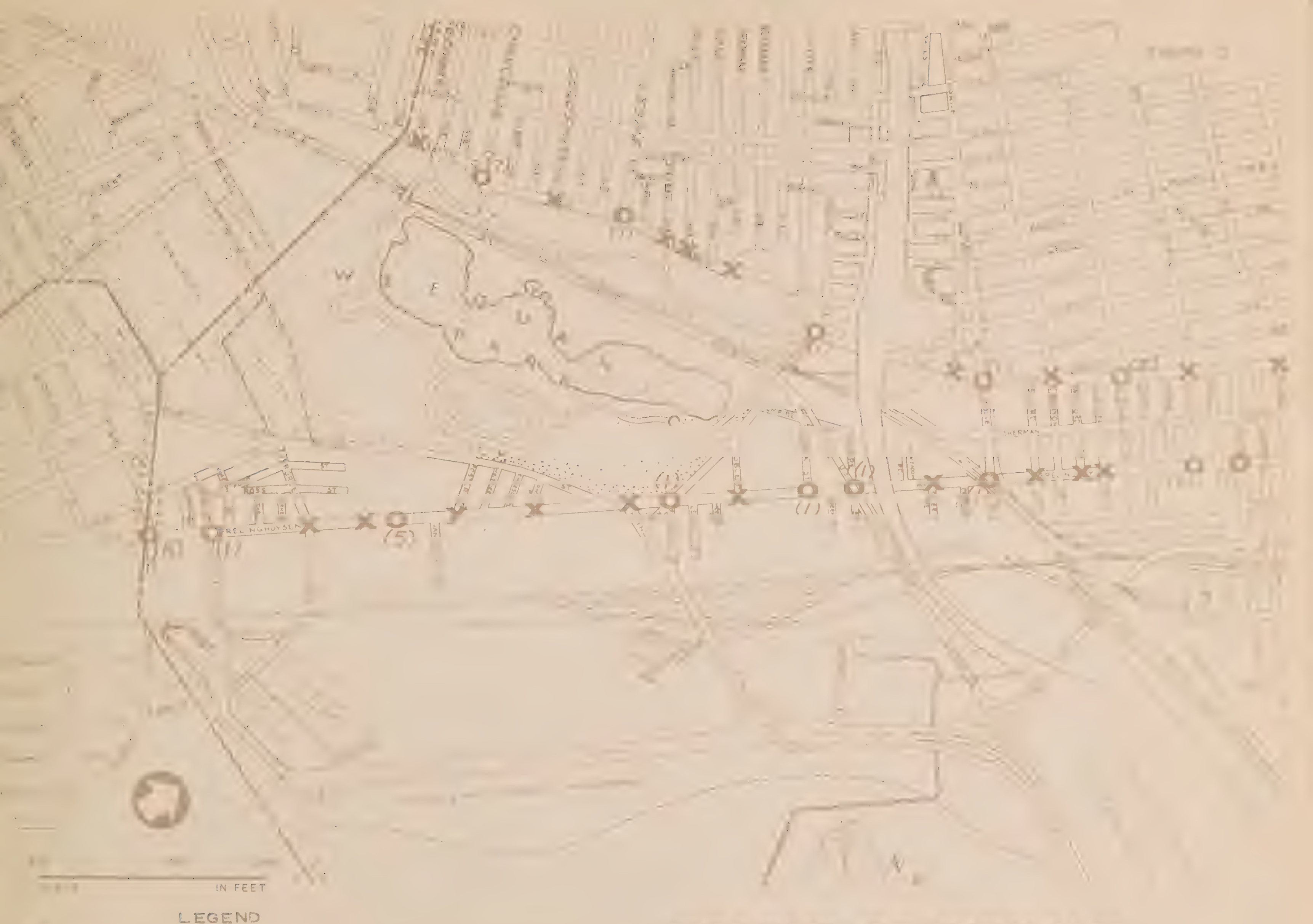


LEGEND

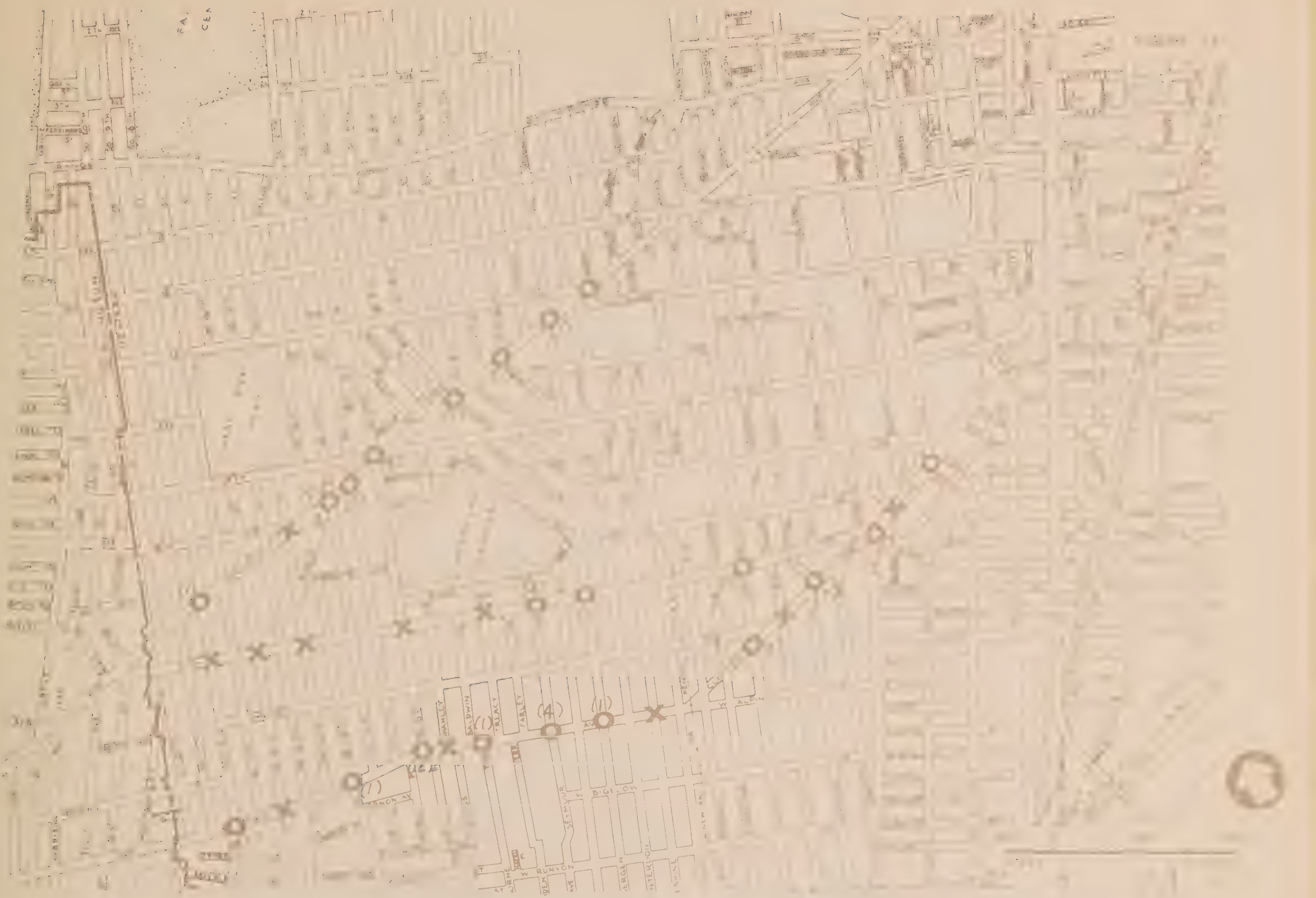
- ○ EXISTING SIGNALS WARRANTED (WARRANT NUMBER)
- ✕ EXISTING SIGNALS NOT WARRANTED
- ● NEW SIGNAL PROPOSED

STATUS OF SIGNALS

CBD SYSTEM



STATUS OF SIGNALS
ELIZABETH AND FRELINGHUYSEN AVENUES



LEGEND

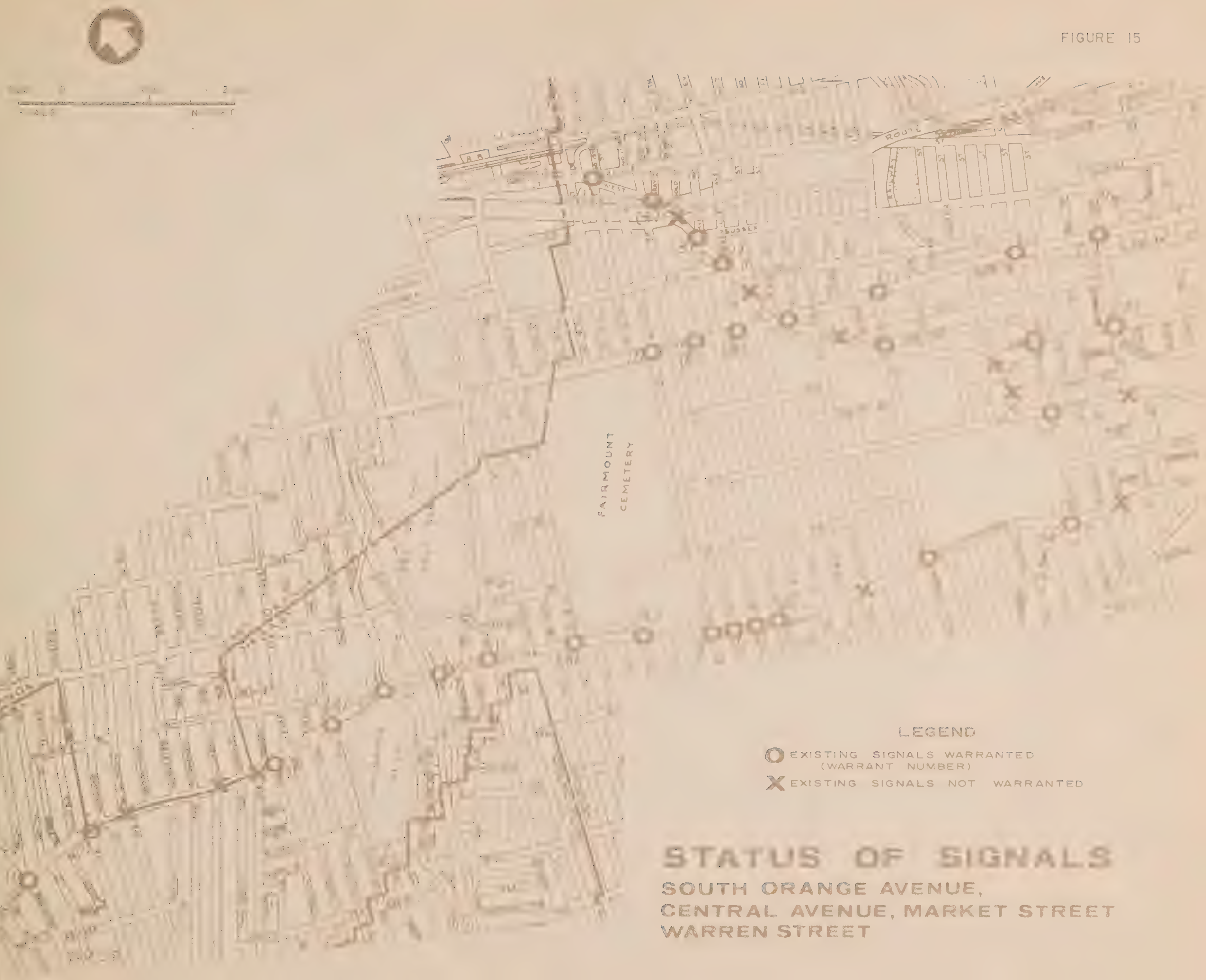
○ EXISTING SIGNALS WARRANTED
(WARRANT NUMBER)

✕ EXISTING SIGNALS NOT WARRANTED

STATUS OF SIGNALS

CLINTON, AVON AND SPRINGFIELD AVENUES

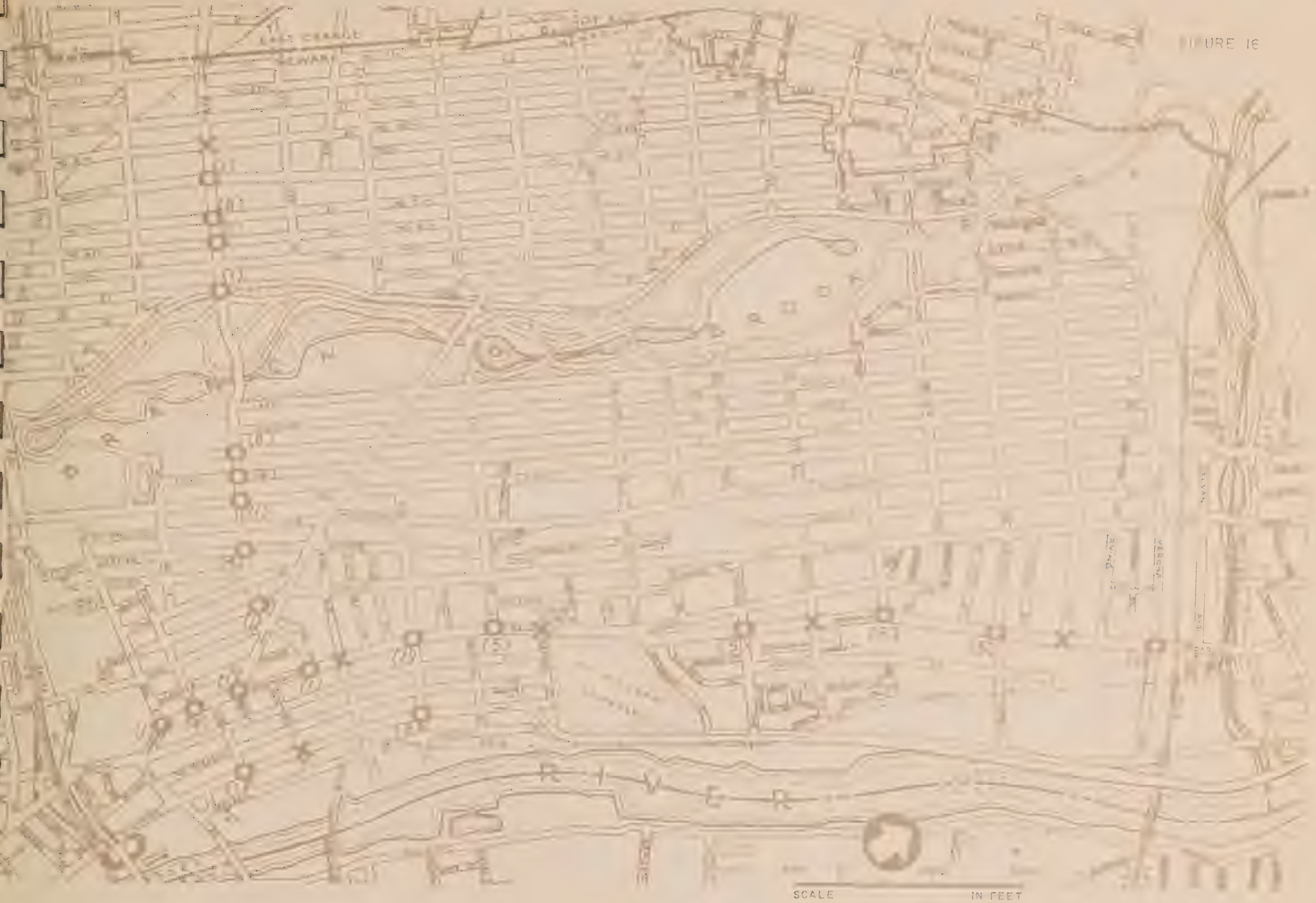
FIGURE 15


FAIRMOUNT CEMETERY
ROUTE
WEST
SUSSEX
LEGEND
EXISTING SIGNALS WARRANTED (WARRANT NUMBER)
EXISTING SIGNALS NOT WARRANTED

STATUS OF SIGNALS

SOUTH ORANGE AVENUE,
CENTRAL AVENUE, MARKET STREET
WARREN STREET

FIGURE 16



LEGEND

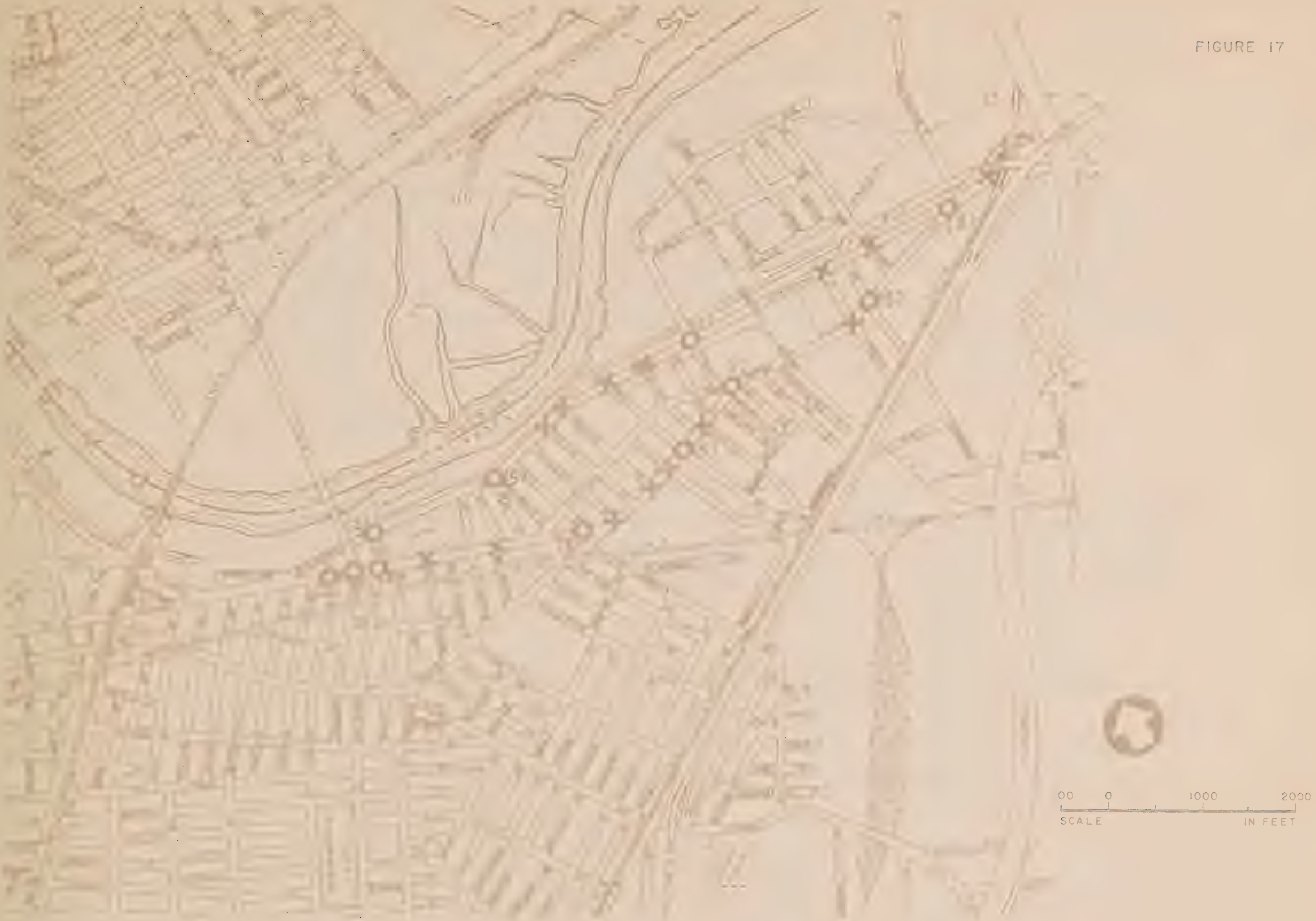
○ EXISTING SIGNALS WARRANTED (WARRANT NUMBER)

✕ EXISTING SIGNALS NOT WARRANTED

STATUS OF SIGNALS

PARK AVENUE, BROADWAY AND McCARTER HIGHWAY

FIGURE 17



LEGEND

○ EXISTING SIGNALS WARRANTED (WARRANT NUMBER)

✕ EXISTING SIGNALS NOT WARRANTED

STATUS OF SIGNALS
RAYMOND BOULEVARD AND MARKET-FERRY STREETS

SIGNAL COORDINATION AND MODERNIZATION

As with most urban centers, Newark experiences vast changes in traffic patterns throughout each day with heavy a.m. and p.m. commuter traffic along its primary corridors. Changes in hourly volumes create significant varied travel patterns which necessitate flexible traffic signal operation along the arterials and within the Central Business District. The TOPICS program has emphasized improvement of this signal system in the CBD and along the most significant traffic corridors in the City.

Central Business District

At present, signal progression must be accomplished manually with only one cycle length and one signal split available. Some 120 signals under a previous system of control were not coordinated properly and had a high breakdown frequency. Thus, this equipment was removed and a manual adjustment approach was instituted so that the signals could be coordinated later into a more responsive system.

In view of these conditions, it is recommended that signals and related equipment in the Central Business District be modernized and coordinated through the installation of expansible pretimed controllers of the type suitable for interconnection. These controllers would be sensitive to existing traffic demands as programmed through prearranged timing plans.

The ability to change cycle lengths could decrease the waiting time at intersections and increase travel speed for motorists during off-peak periods. Alteration of signal splits during morning, evening and off-peak periods in accordance with changes in traffic patterns could increase capacity and decrease delays throughout the system.

There exists the possibility of utilizing some or all of the existing controller and sensor hardware. A new centrally controlled traffic adjusted signal system is proposed. This signal system would be developed for use initially in the CBD with the capacity for expansion to include all remaining City signals and operating from one central control headquarters. This arrangement would offer the flexibility for overall system control as well as adaptation to certain subsystems for coping with unique traffic conditions.

Utilizing either a selected predetermined program (table look-up) or generated timing plans based upon pre-program logic, the installation would be sensitive to dynamic traffic conditions as recorded by traffic sensors. Interconnection apparatus would also be available for control of a series of intersections with a single program or timing plan. Overall communications would be handled via leased components, telephone lines or City-owned cable.

Arterial Systems

Arterial signal progression is also presently operated on a manual basis, limited to one set cycle length and split. Improvement to MUTCD standards is also recommended for signals on these roadways in terms of the condition of the signals themselves and their placement.

At present, the signals are extremely susceptible to imbalance and malfunction. Changes in voltage or losses of power throw the systems out of balance, and the mechanism does not have the faculty to resynchronize itself. Therefore, the interconnection of signals on each respective corridor is recommended to achieve effective coordination on both a system and arterial level. The system will provide the capability of morning peak, evening peak and off-peak splits at each intersection with separate cycle lengths for each time period. Each corridor will be timed independently of all others to achieve ultimate flexibility to cope with changing traffic conditions. The exact type of interconnection and control equipment has not been specified as these decisions will have to be made at the time of final design. For the purpose of estimating costs it was assumed that there would be the following:

• Master control equipment for each corridor	$20,000
• Local control hardware for each signalized intersection (includes $1,200 to modernize each local controller and $1,000 for telemetry equipment):	$ 2,200
• Communications for each signalized intersection (this phase consists of the ten year amortized portion of the cost of using telephone cable which reflects capital investment and also the annual telephone line cost; installing separate signal interconnect cable is a more expensive, but possible, alternate):	$ 150 + $13/year (first ten years then $26/year)

In addition to the above, each arterial system will be modernized to bring all warranted signals into compliance with the MUTCD.

CORRIDOR IMPROVEMENT PROJECTS

Initial investigation toward identifying traffic problem locations involved study of major traffic corridors within Newark. Logically most intersections experiencing capacity or safety problems would exist along these heavily traveled roads and be classified as requiring improvement. From this group of major traffic routes, the following corridors were found to be particularly critical and were selected for improvement study.

1. Frelinghuysen Avenue from Poinier Street to the City Line
2. Clinton Avenue from Stratford Avenue to Broad Street
3. Washington Street-University Avenue from Clinton Avenue to Court Street
4. Market Street-Springfield Avenue from Washington Street to South Orange Avenue
5. Central Avenue from West Market Street to Twelfth Street
6. Broad Street from Central Avenue to Clay Street
7. McCarter Highway from Saybrook Place to Clark Street
8. Bloomfield Avenue from Broadway to the Newark-Bloomfield Line.

Subsequent discussions present existing problems experienced along each of these corridors and proposed recommendations to eliminate these undesirable conditions. Spot improvements at critical locations within each corridor are shown on functional plans immediately following corresponding corridor descriptions.

TABLE 5

LEGEND FOR IMPROVEMENT DRAWINGS

SYMBOLS

Pole	●	Non-Illuminated Overhead Sign	⊥	Pavement Edge where driveways are present	----
Street Light	✷●	Illuminated Overhead Sign	▭	Tree	✿
Fire Hydrant	⌖	Pedestrian Walk-Wait Signal	○□□	Pavement Arrow	↱ →
Sign on Post	◀	Traffic Signal Heads with Mast Arm	↓↓	Painted Channelization	▨
Existing Sign	KR	Pressure Detector	▬	Raised Channelization	◺
Proposed Sign	KEEP RIGHT	Loop Detector	⊏⊐	Right-of-Way Line	—·—

EXISTING SIGN MESSAGE ABBREVIATION

OW - One Way
BS - Bus Stop
DNE - Do Not Enter
KR - Keep Right
LLMTL - Left Lane Must Turn Left
RLMTR - Right Lane Must Turn Right
NLT - No Left Turn
NRT - No Right Turn

NSOS - No Stopping or Standing
NSSOP - No Stopping, Standing or Parking
NSBS - No Stopping Bus Stop
NS7-9A, 4-6P - No Stopping 7-9 A.M., 4-6 P.M.
NPAT - No Parking Any Time
NPHTC - No Parking Here to Corner
NPLZ - No Parking Loading Zone

IMPROVEMENT CORRIDOR 1

FRELINGHUYSEN AVENUE FROM THE CITY BOUNDARY TO POINIER STREET

Existing Conditions

Serving as an arterial between the Cities of Newark and Elizabeth, as well as a major access road to industrial areas in Newark, Frelinghuysen Avenue generally has a 70-foot pavement width except that it narrows to 52 feet north of Alpine Street. The condition of the pavement is generally poor, and there are no existing lane lines indicated. Parking is not qenerally restricted on either side of Frelinghuysen Avenue. During peak hours the pavement is used by two lanes of traffic in each direction and vehicles are parked adjacent to both curbs. Frequent left-turning maneuvers at intersections as well as the presence of residential complexes and industrial plants along the road promote accident hazards and delays to traffic.

Presently there are 18 traffic signals on Frelinghuysen Avenue from Virginia Street to Poinier Street, and they operate without any apparent timing coordination. Traffic counts taken at various intersections did not indicate serious capacity problems and pedestrian traffic is generally light. Analysis of accident experience revealed that only at the intersection of Frelinghuysen Avenue with Meeker Avenue have more than five accidents occurred annually. Traffic volumes are approximately 17,000 to 21,000 on an average weekday with about 1,100 vehicles per hour in one direction during the peak hours.

A major sewer installation is proposed on Frelinghuysen Avenue, and repaving of the street will be necessary in connection with that work. Traffic engineering studies were conducted under TOPICS so that traffic flow on this arterial might be improved at the same time sewer construction is undertaken. A determination of exactly which portions of the improvement projects are eligible for TOPICS funding is to be made at a later date.

Problems	Recommendations
• Inadequate lane line markings cause uncertainty for drivers and prevent the efficient use of the available pavement area.	• Install proper lane line markings preferably of thermoplastic material to guide drivers properly.
• Frequent left-turning maneuvers at intersections and at industrial developments result in accident potential and delays to traffic.	• Develop left-turning lanes at intersections and install continuous left-turning lanes at areas where heavy industrial development in mid-block areas results in heavy left-turning movements. (See attached typical plan.)
• The absence of signal coordination causes frequent stopping, in some cases at adjacent intersections.	• Provide physical interconnection of traffic signals and develop progressive movement of traffic in both directions which would entail retaining traffic signals at some intersections, based on the signal progression warrant, where traffic volumes alone would not justify their existence.
• Parking restrictions are not posted or enforced near intersections causing safety problems and capacity deficiencies.	• Properly designate, adequately post and enforce "NO PARKING" zones near intersections to increase sight distance. In some instances "no parking" restrictions should be further extended to provide turning lanes for heavy right-turning volumes and/or bus stop areas at the curb lane.
• The poor condition of the pavement and the occasional flooding of the roadway causes safety problems and delays.	• Construct storm sewers in the area to eliminate flooding hazards. Repave the entire roadway prior to the installation of lane lines to increase driving safety, travel speed and driver convenience. (Not eligible for TOPICS funding.)
• Lack of proper street signing causes delays and confusion to the unfamiliar driver.	• Install legible street name signs at all intersections to reduce driver hesitation and thus accident potential.

IMPROVEMENT LOCATION 1A

FRELINGHUYSEN AVENUE AND POINIER STREET

Problems	Recommendations
• The offset at this intersection, created by the narrow westerly approach of Poinier Street, coupled with the simultaneous operation of through eastbound traffic on Poinier Street with a heavy right-turn movement, results in a hazardous and inefficient merging movement.	• Install an island at the southeast quadrant to properly separate and protect through movements and turning movements.
• Lack of pavement markings causes driver confusion and reduced capacity.	• Install lane lines as shown on the accompanying plan.
• Current parking practice is a safety hazard and reduces the number of approach lanes to the intersection.	• Post and enforce parking restrictions indicated on the accompanying plan.
• The absence of street name signs delays the unfamiliar motorists at this important turning intersection.	• Install proper street signs and directional signs to aid traffic flow.

IMPROVEMENT LOCATION 1B

FRELINGHUYSEN AVENUE - ROUTE 22 - EMPIRE STREET

Problems	Recommendations
• Left-turning traffic from northbound Frelinghuysen Avenue onto Empire Street must execute a very difficult maneuver due to the relative location of Empire Street and a pier in the center of Frelinghuysen Avenue. Traffic from the Route 22 exit ramp onto Empire Street also has to detour around this pier.	• Relocate the terminus of Empire Street northward to permit more direct left-turning movement. Install a painted island at the center of the new intersection as shown on the accompanying plan. Create a separate left-turning lane for northbound Frelinghuysen Avenue.
• Left-turning vehicles from southbound Frelinghuysen Avenue onto the eastbound entrance ramp of Route 22 are forced to make a very difficult movement, especially dangerous for the large number of semi-trailers making this turn.	• Construct a left-turning lane for southbound Frelinghuysen Avenue, protected by an island. Relocate this movement from the southern end of the pier to the northern end. Install an island to separate the left- and right-turning movements onto the entrance ramp.
• Lack of channelization at the exit ramp terminal of Route 22 causes driver confusion.	• Construct an island at the intersection of the ramp and Frelinghuysen Avenue to define travel lanes.

IMPROVEMENT LOCATION 1C

FRELINGHUYSEN AVENUE, MEEKER AVENUE AND FENWICK STREET

Problems	Recommendations
• The skewed configuration of the intersecting roads results in a wide intersection lacking proper traffic control and channelization.	• Cut back the northwest corner of the intersection and provide a right-turning movement from southbound Frelinghuysen Avenue onto westbound Meeker Avenue under YIELD control. Install a triangular island at this corner to adequately separate and protect traffic.
• Lack of pavement markings inhibits proper traffic movements and restricts the flow of traffic through the intersection.	• Install pavement markings to provide: separate left-turn lanes on both approaches of Frelinghuysen Avenue to accommodate the heavy left-turning volumes; left-turn lanes on both approaches of Meeker Avenue; adequate pedestrian crosswalks; and proper stop lines on all approaches to minimize the width of the intersection.
• The skewed alignment and the unshielded signals result in simultaneously visible red and green indications.	• Install programmed visibility signals and/or louvered signals to eliminate conflicting indications.
• Existing traffic signal phasing and installation inhibits efficient movement of traffic.	• Install new signal indications and appropriate timing to improve safety and intersection capacity. Include an all-red clearance interval to increase safety.
• Lack of traffic control on the Fenwick Street approach causes driver confusion and accident potential.	• Install semi-actuated signal, stop line and lane markings on the Fenwick Street approach.
• No parking restrictions are posted.	• Adopt and post parking restrictions near the intersection as shown on the accompanying plan.

IMPROVEMENT LOCATION 1D

FRELINGHUYSEN AVENUE AND HAYNES AVENUE

Problems	Recommendations
• The flow of vehicles at the intersection is currently controlled by a traffic signal.	• Remove the traffic signal since analysis of the traffic volumes indicated that warrants for it are not met. Install a stop sign on the Haynes Avenue approach of the intersection to adequately control traffic.
• The lack of posted parking restrictions and pavement markings reduces the efficiency of the intersection.	• Post parking restrictions and install lane lines to provide for four traffic lanes on Haynes Avenue.

IMPROVEMENT LOCATION 1E

FRELINGHUYSEN AVENUE AND DAYTON STREET

Problems	Recommendations
● The lack of proper channelization results in a large pavement area without adequate traffic control, which causes driver confusion.	● Install a triangular island to separate the northbound and southbound traffic on Dayton Street. Prohibit left turns from northbound Frelinghuysen Avenue onto Dayton Street at this intersection. Install a stop sign on the Dayton Street approach.
● The queue of traffic at the Haynes Avenue signal at times goes beyond the Dayton Street intersection, blocking the way of drivers who wish to turn north on Frelinghuysen Avenue.	● Remove this traffic signal to create a longer storage area and thus alleviate the problem. (Existing signal does not meet established warrants.)
● No parking restrictions are posted on the approaches of the intersection.	● Post parking restrictions to maintain necessary sight distance and approach capacity.

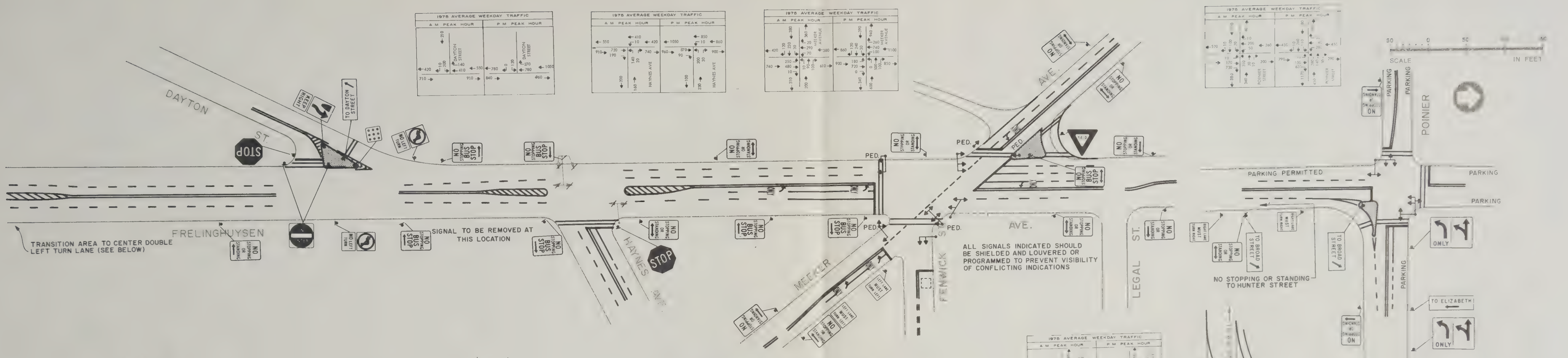
2

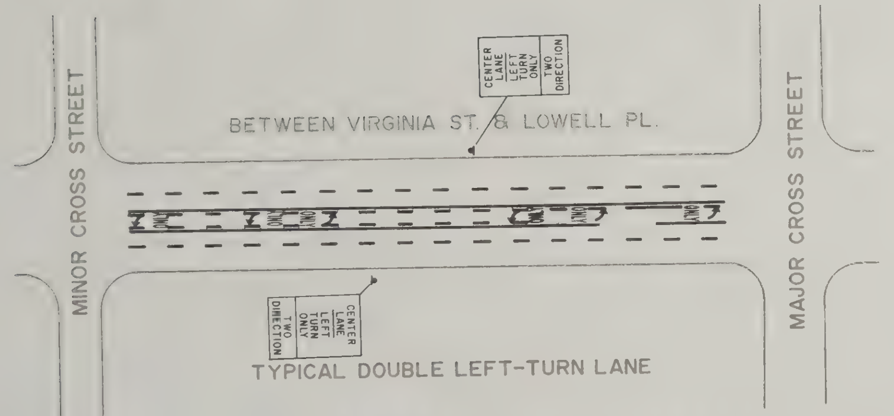
IMPROVEMENT LOCATION 1E

FRELINGHUYSEN AVENUE AND DAYTON STREET

Problems	Recommendations
• The lack of proper channelization results in a large pavement area without adequate traffic control, which causes driver confusion.	• Install a triangular island to separate the northbound and southbound traffic on Dayton Street. Prohibit left turns from northbound Frelinghuysen Avenue onto Dayton Street at this intersection. Install a stop sign on the Dayton Street approach.
• The queue of traffic at the Haynes Avenue signal at times goes beyond the Dayton Street intersection, blocking the way of drivers who wish to turn north on Frelinghuysen Avenue.	• Remove this traffic signal to create a longer storage area and thus alleviate the problem. (Existing signal does not meet established warrants.)
• No parking restrictions are posted on the approaches of the intersection.	• Post parking restrictions to maintain necessary sight distance and approach capacity.

FIGURE 18

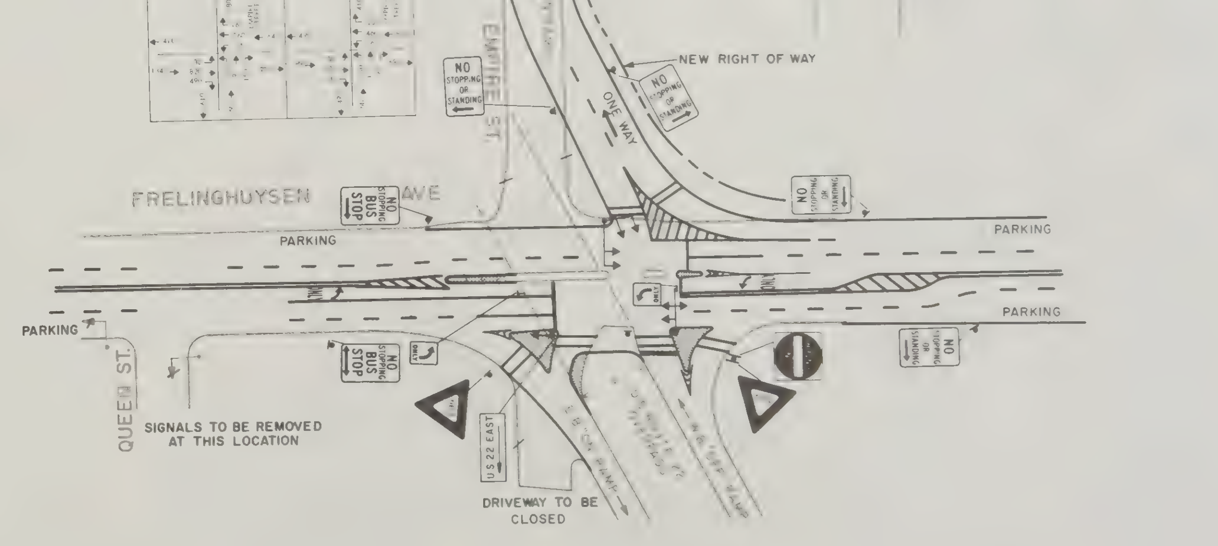



CENTER LANE LEFT TURN ONLY TWO DIRECTION
BETWEEN VIRGINIA ST. & LOWELL PL.
MINOR CROSS STREET
MAJOR CROSS STREET
CENTER LANE LEFT TURN ONLY TWO DIRECTION

TYPICAL DOUBLE LEFT-TURN LANE

PHASE	WITH ACTUATION				WITHOUT ACTUATION			
	FREL.	MEEKER	FENWICK	%	FREL.	MEEKER	FENWICK	%
	G	R	R	50	G	R	R	55
	R	G	R	38	R	G	R	45
	R	R	G	12				

PROPOSED 3 PHASE SIGNAL AT MEEKER AVENUE WITH SEMI-ACTUATED 3RD PHASE FOR FENWICK STREET.



IMPROVEMENT CORRIDOR-1

FRELINGHUYSEN AVENUE

IMPROVEMENT CORRIDOR 2

CLINTON AVENUE, BROAD STREET TO STRATFORD AVENUE

Existing Conditions

Clinton Avenue is a major traffic corridor within the City of Newark. The section from Broad Street to Elizabeth Avenue is the initial link used to carry vehicles from the southern section of the CBD to the southern and western suburbs. Sizeable traffic flows and serious congestion are experienced on this link, especially during peak commuter periods. This artery also serves as an important bus transit route with primary bus lines (Transport of New Jersey #13, 14 and 16) offering service to and from the Central Business District.

Traffic conditions along Clinton Avenue will undoubtedly be altered once the proposed transition of Washington Street to two-way traffic becomes a reality. This change, from University Avenue to Washington Street (see Improvement Corridor 3) will reduce congestion on High Street and Broad Street and simplify movements at the Clinton-High intersection.

Improvements in this corridor are described under Spot Improvements 2A-2E.

IMPROVEMENT LOCATIONS 2A AND 2B

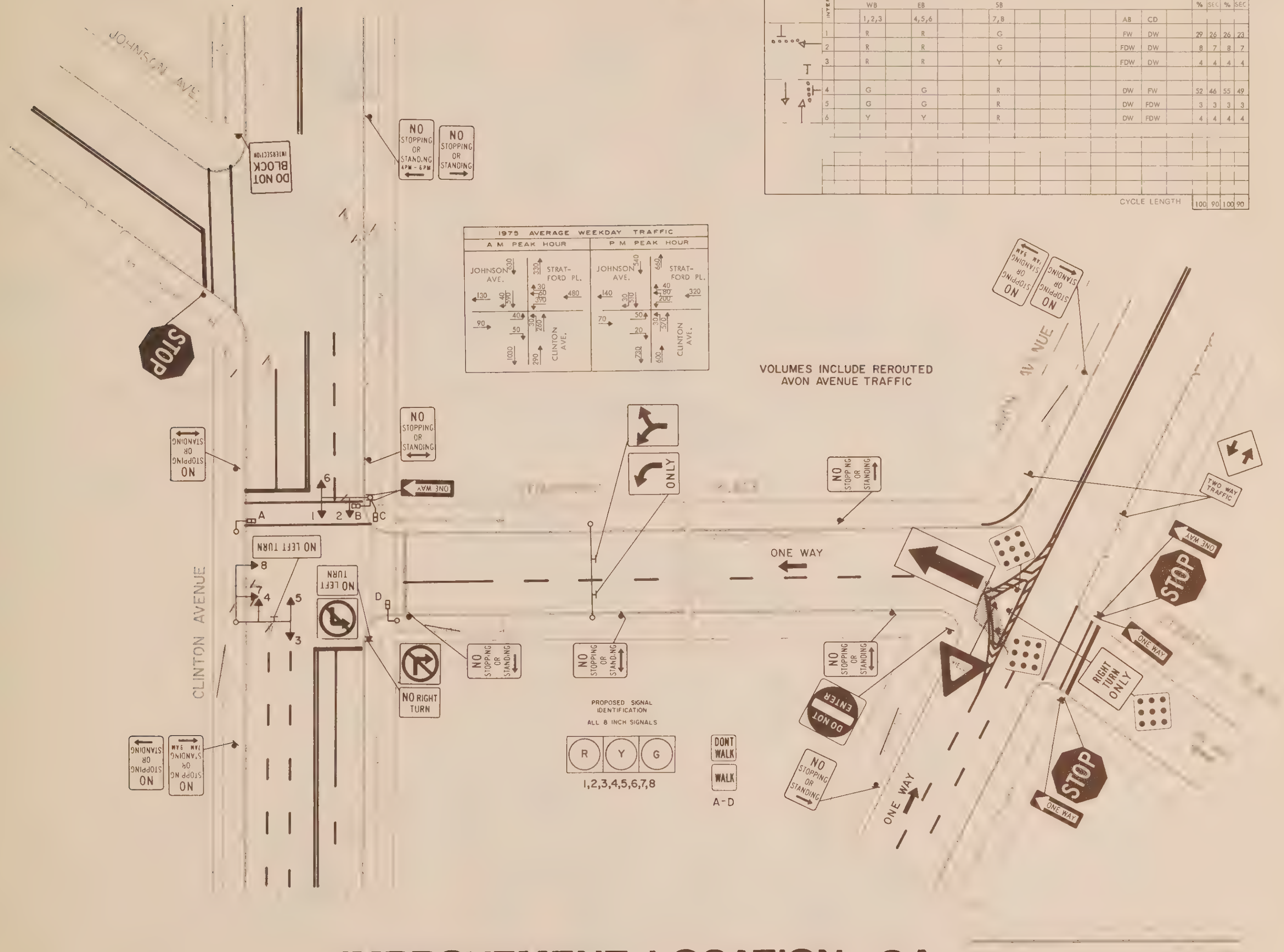
HAYES CIRCLE

Problems	Recommendations
• Lack of channelization coupled with the wide approaches permits uncontrolled vehicle movements through the intersection.	• Provide channelizing islands to direct the flow of traffic.
• Simultaneous operation of the Avon and Clinton Avenue eastbound approaches provides a dangerous situation of conflicting traffic movement.	• Institute one-way outbound regulations on Avon Avenue and divert the Avon inbound traffic to Clinton Avenue eastbound via Stratford Place to provide a functional three-phase operation at Level-of-Service C.
• Conflict exists between westbound Clinton Avenue traffic turning left to Wright Street and the Elizabeth Avenue through movement.	• Eliminate this left turn, thus utilizing all approach lanes on westbound Clinton Avenue for through traffic.
• Traffic on Clinton Avenue eastbound will be increased in the a.m. peak from 700 vph to 1,000 vph due to recommended changes in traffic flow on Avon Avenue.	• Restrict parking during peak hours and offset the centerline to provide an additional eastbound lane, thus permitting the approach to operate at Level-of-Service C.
• Due to the traffic volumes, there exists excessive delay time during the p.m. peak on westbound Clinton Avenue.	• Widen the north side of Clinton Avenue ten feet. The Clinton Avenue to Avon Avenue and Clinton Avenue to Clinton Avenue movements will have three approach lanes, and the Clinton Avenue to Elizabeth Avenue movement will have two lanes. Widen the eastbound approach of Elizabeth Avenue to three through lanes.

FIGURE 19

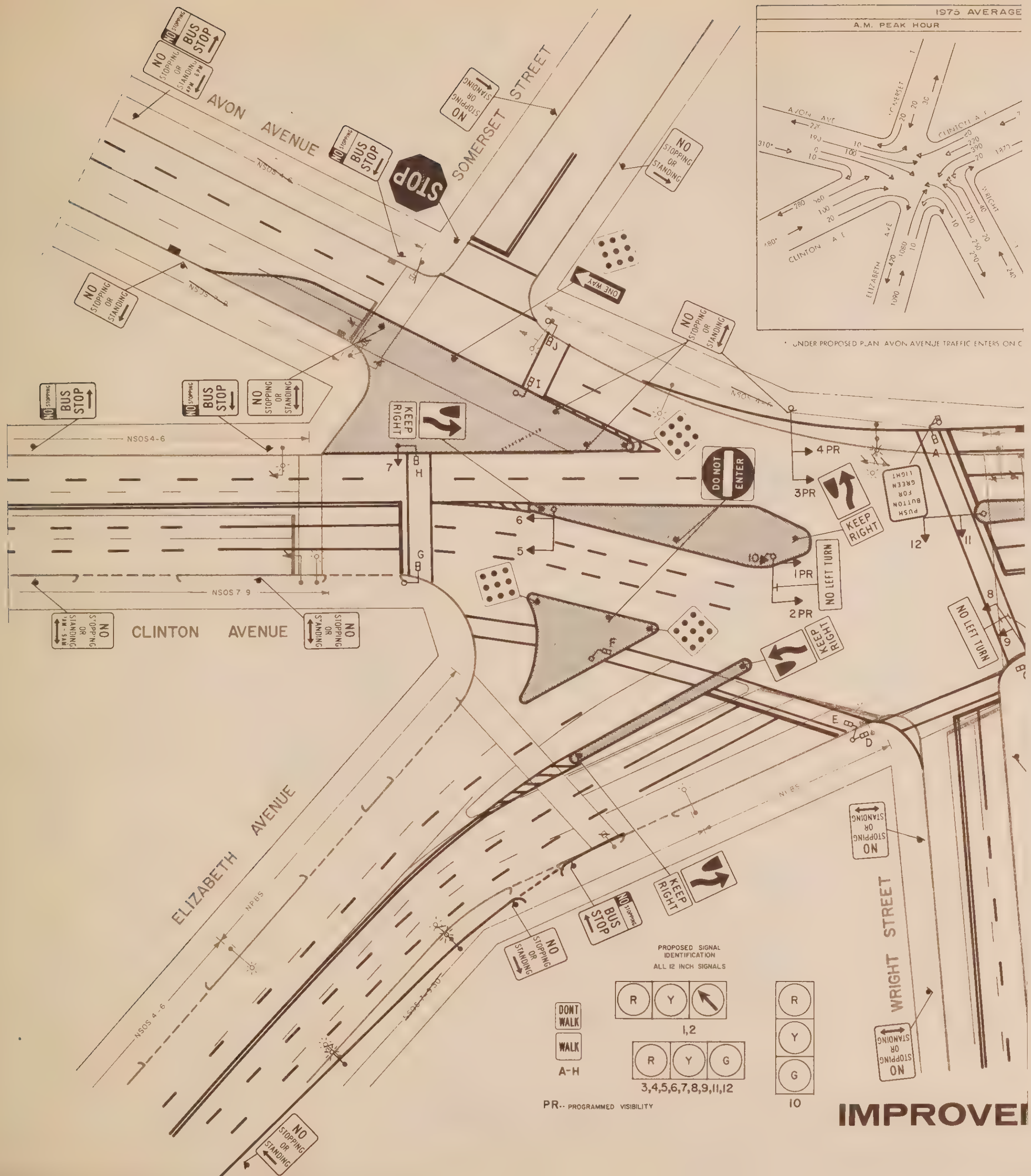
TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	CLINTON AVE WB 1,2,3	CLINTON AVE EB 4,5,6	STRATFORD PL SB 7,8	PEDESTRIANS AB	PEDESTRIANS CD	TIMING A.M %	TIMING A.M SEC	TIMING P M %	TIMING P M SEC
	1	R	R	G	FW	DW	29	26	26	23
	2	R	R	G	FDW	DW	8	7	8	7
	3	R	R	Y	FDW	DW	4	4	4	4
	4	G	G	R	DW	FW	52	46	55	49
	5	G	G	R	DW	FDW	3	3	3	3
	6	Y	Y	R	DW	FDW	4	4	4	4
						CYCLE LENGTH	100	90	100	90



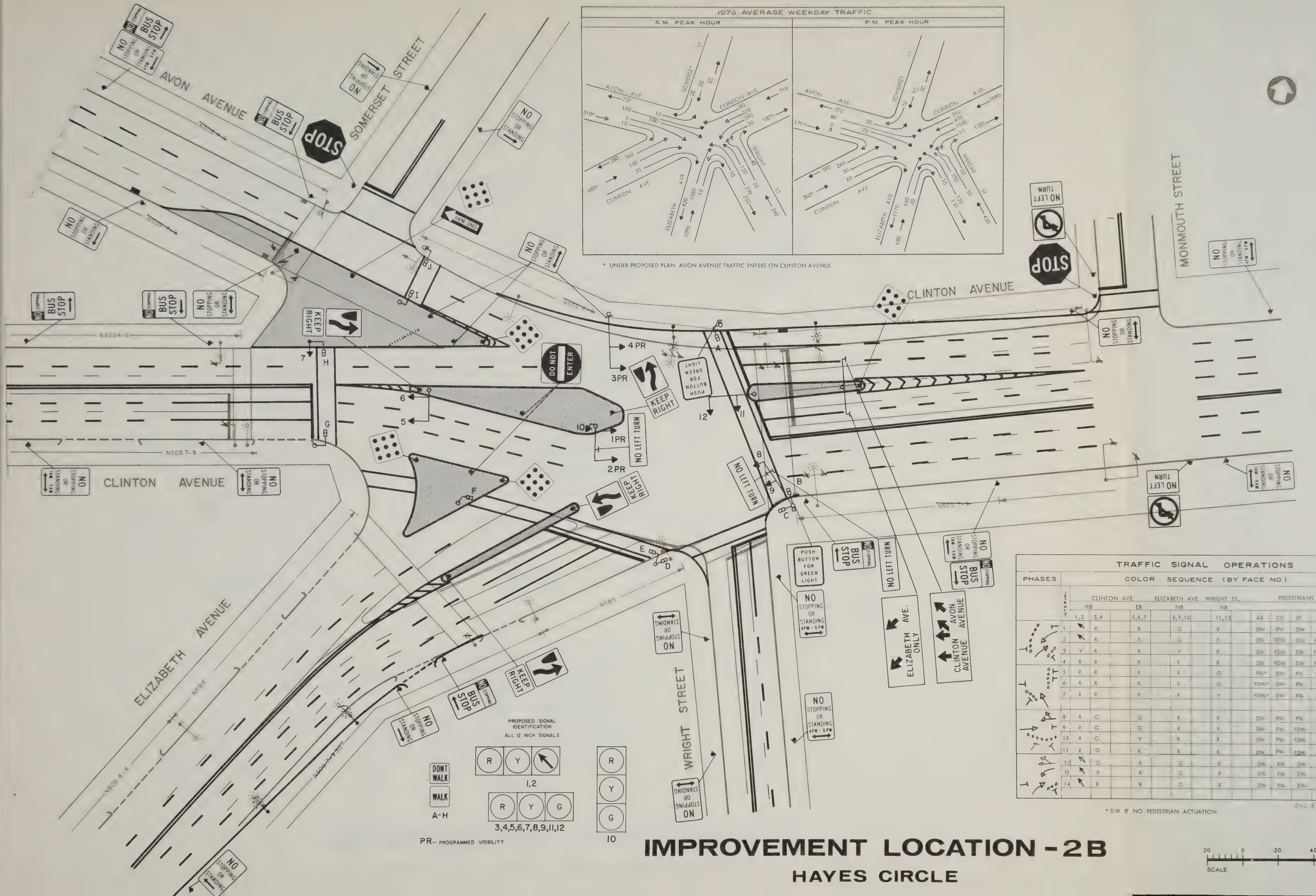
IMPROVEMENT LOCATION - 2A

STRATFORD PLACE


1975 AVERAGE
A.M. PEAK HOUR
AVON AVE
SOMERSET
CLINTON AVE
WRIGHT
ELIZABETH AVE
UNDER PROPOSED PLAN AVON AVENUE TRAFFIC ENTERS ON C
AVON AVENUE
SOMERSET STREET
CLINTON AVENUE
ELIZABETH AVENUE
WRIGHT STREET
NO STOPPING BUS STOP
NO STOPPING OR STANDING
STOP
ONE WAY
DO NOT ENTER
KEEP RIGHT
NO LEFT TURN
PUSH BUTTON FOR GREEN LIGHT
NSOS 4-6
NSOS 7-9
NPBS
4 PR
3 PR
1 PR
2 PR
PROPOSED SIGNAL IDENTIFICATION
ALL 12 INCH SIGNALS
R
Y
G
1,2
3,4,5,6,7,8,9,11,12
10
DONT WALK
WALK
A-H
PR.. PROGRAMMED VISIBILITY

IMPROVE

FIGURE 20



* UNDER PROPOSED PLAN AVON AVENUE TRAFFIC ENTERS ON CLINTON AVENUE

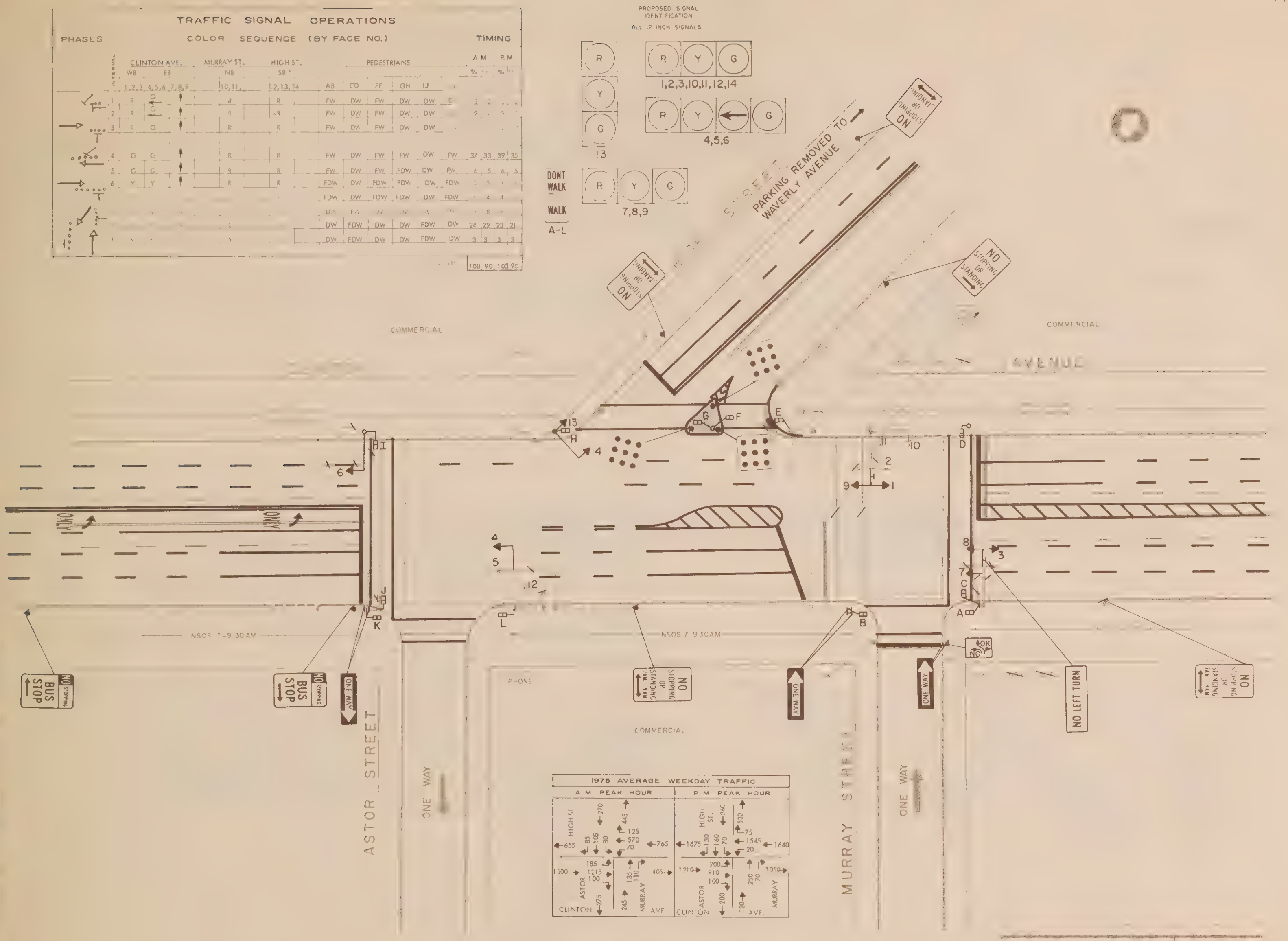
PHASES	INTERVAL	CLINTON AVE WB 1,2	CLINTON AVE WB 3,4	CLINTON AVE EB 5,6,7	ELIZABETH AVE NB 8,9,10	WRIGHT ST. NB 11,12	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	PEDESTRIANS IJ	WITH PED ACTUATION TIMING A.M. %	WITH PED ACTUATION TIMING A.M.	WITH PED ACTUATION TIMING P.M. %	WITH PED ACTUATION TIMING P.M.	NO PED ACTUATION TIMING A.M %	NO PED ACTUATION TIMING A.M	NO PED ACTUATION TIMING P.M %	NO PED ACTUATION TIMING P.M
	1	↖	R	R	G	R	DW	FW	DW	FW	FW	8	7	14	12	10	11	14	12
	2	↖	R	R	G	R	DW	FDW	DW	FDW	FW	7	7	8	7	6	7	8	7
	3	Y	R	R	Y	R	DW	FDW	DW	FDW	FDW	3	3	3	3	3	3	3	3
	4	R	R	R	R	R	DW	FDW	DW	FDW	FDW	2	2	2	2	2	2	2	2
	5	R	R	R	R	G	FW*	DW	FW	DW	DW	7	6	7	6	23	20	20	18
	6	R	R	R	R	G	FDW*	DW	FW	DW	DW	24	21	24	21	-	-	-	-
	7	R	R	R	R	Y	FDW*	DW	FW	DW	DW	3	3	3	3	3	3	3	3
	8	R	G	G	R	R	DW	FW	FW	DW	DW	10	9	1	1	15	13	1	1
	9	R	G	G	R	R	DW	FW	FDW	DW	DW	22	19	22	19	22	19	22	19
	10	R	G	Y	R	R	DW	FW	FDW	DW	DW	3	3	3	3	3	3	3	3
	11	R	G	R	R	R	DW	FW	FDW	DW	DW	2	2	2	2	2	2	2	2
	12	↖	G	R	G	R	DW	FW	DW	DW	DW	1	1	4	4	1	1	15	13
	13	↖	Y	R	G	R	DW	FW	DW	DW	DW	3	3	3	3	3	3	3	3
	14	↖	R	R	G	R	DW	FW	DW	DW	DW	4	4	4	4	4	4	4	4
											CYCLE LENGTH	100	90	100	90	100	90	100	90

* DW IF NO PEDESTRIAN ACTUATION

IMPROVEMENT LOCATION - 2B

HAYES CIRCLE

FIGURE 21



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	COLOR SEQUENCE (BY FACE NO.) CLINTON AVE. WB	EB		MURRAY ST. NB	HIGH ST. SB	PEDESTRIANS						TIMING A M		P M	
		WB	EB		NB	SB							%		%	
		1,2,3	4,5,6	7,8,9	10,11	12,13,14	AB	CD	EF	GH	IJ					
	1	R	G ←	↑	R	R	FW	DW	FW	DW	DW	[illegible]	3	[illegible]		
	2	R	G ←	↑	R	R	FW	DW	FW	DW	DW		9			
	3	R	G	↑	R	R	FW	DW	FW	DW	DW					
	4	G	G	↑	R	R	FW	DW	FW	FW	DW	FW	37	33	39	35
	5	G	G	↑	R	R	FW	DW	FW	FDW	DW	FW	6	5	6	5
	6	Y	Y	↑	R	R	FDW	DW	FDW	FDW	DW	FDW	3	3		
						R	FDW	DW	FDW	FDW	DW	FDW	4	4	4	
		R	R	R			DW	FW	DW	DW	FW	DW		8		
		R	R	R	G	G	DW	FDW	DW	DW	FDW	DW	24	22	23	21
		R			Y		DW	FDW	DW	DW	FDW	DW	3	3	3	3
													100	90	100	90

IMPROVEMENT LOCATION - 2C

CLINTON AVENUE AND HIGH STREET

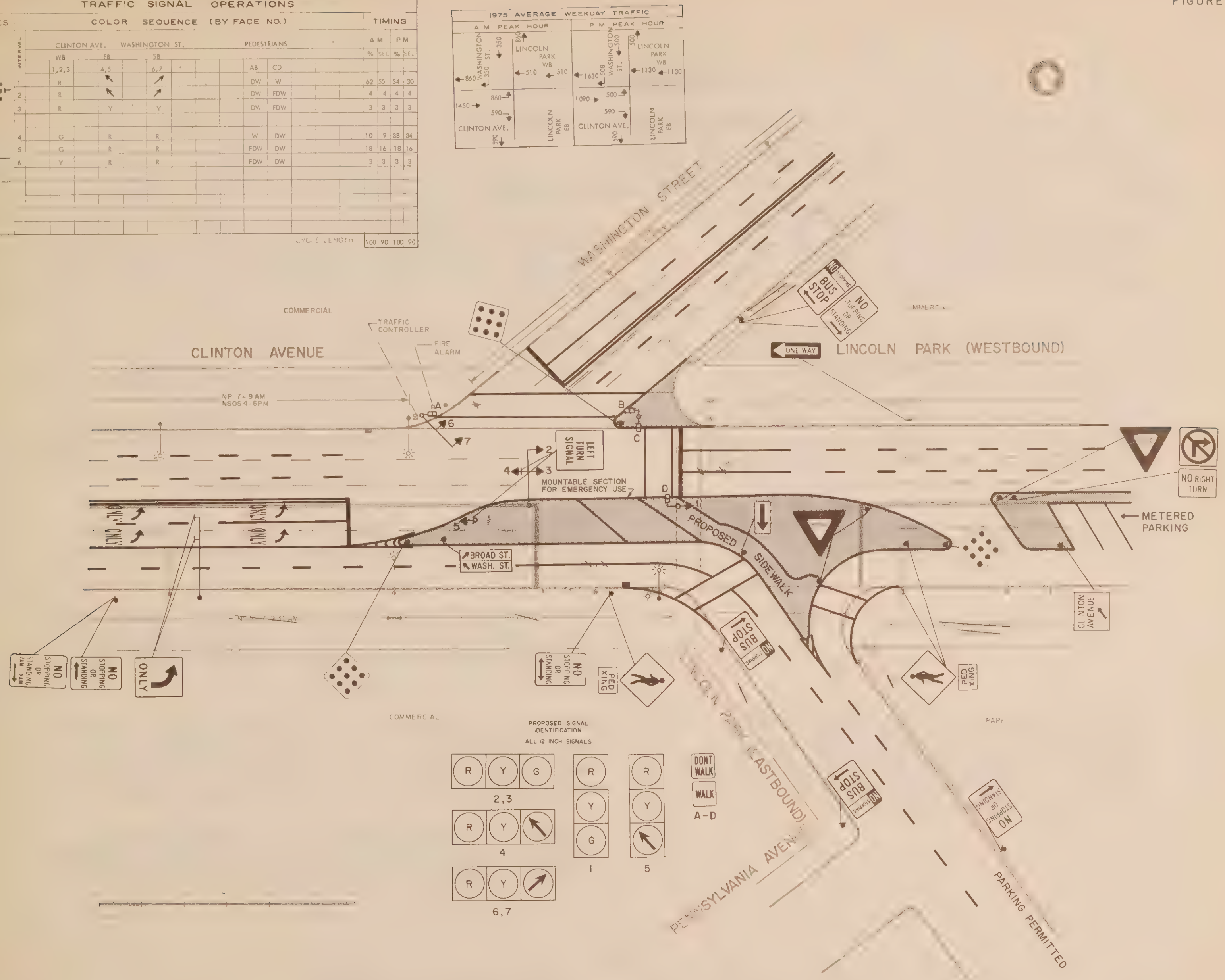
IMPROVEMENT LOCATION 2D

CLINTON AVENUE AND WASHINGTON STREET

Problems	Recommendations
● Because of insufficient vehicular lane control and a high turning volume, the motorists traveling eastbound on Clinton Avenue desiring to turn onto Washington Street are indecisive whether to queue in one lane or two. During the peak hour the left-turn volumes (860, a.m.; 500, p.m.) make a two lane queue necessary, but the two lanes are not provided in the existing lane marking patterns.	● Provide double left-turn force-off lanes for the turning volumes to function at Level-of-Service C.
● Existing angle parking should not be permitted on a TOPICS network street.	● Construct a 4-foot median down the center of Lincoln Park (westbound) between Washington Street and Broad Street to isolate the parked cars from the through vehicles. To facilitate a safer entrance and exit to and from the parking area, it is recommended that the parked vehicles face north rather than south.
● The conversion of Washington Street to two-way flow requires that this flow be forced westbound on Clinton Avenue and not permitted to turn left into Lincoln Park eastbound. Otherwise a three-phase signal would be necessary and capacity problems would develop.	● Construct a large channelizing island to block off access to Lincoln Park eastbound from Washington Street. This island also will provide a force-off situation for the left turn from Clinton Avenue to Washington Street, and from the angle parking area to Lincoln Park eastbound, and provide a pedestrian refuge.

TRAFFIC SIGNAL OPERATIONS

PHASES / INTERVAL	COLOR SEQUENCE (BY FACE NO.) CLINTON AVE. WB 1,2,3	WASHINGTON ST. EB 4,5	SB 6,7	PEDESTRIANS AB	CD	TIMING A M %	A M SEC	P M %	P M SEC
1	R	↖	↗	DW	W	62	55	34	30
2	R	↖	↗	DW	FDW	4	4	4	4
3	R	Y	Y	DW	FDW	3	3	3	3
4	G	R	R	W	DW	10	9	38	34
5	G	R	R	FDW	DW	18	16	18	16
6	Y	R	R	FDW	DW	3	3	3	3
CYCLE LENGTH						100	90	100	90



IMPROVEMENT LOCATION - 2D

CLINTON AVENUE AND WASHINGTON STREET

IMPROVEMENT LOCATION 2E

BROAD STREET AT LINCOLN PARK

Problems	Recommendations
● The traffic signal at Broad Street and Pennington Street does not satisfy any of the signal warrants set forth in the Manual on Uniform Traffic Control Devices.	● Pedestrians desiring to cross at Pennington Street will do so at Lincoln Park eastbound. A pedestrian-actuated phase inserted into the signal operation at Lincoln Park eastbound will facilitate this movement.
● The reduction from four lanes southbound on Broad Street to two lanes presently is accomplished without clear definition for the motorist, which leads to hazardous merges and lane changes. Also, Lincoln Park westbound is very wide (76 feet) and skewed, leading to a large undefined intersection area and an extremely long crosswalk, where the pedestrian is subject to high-speed (for city streets) turning traffic.	● Institute the right-hand southbound lane as a force-off lane to Lincoln Park westbound by extending the north tip of the park area into Broad Street sufficiently to block through traffic in that lane. It also will make possible the elimination of the signal at Camp Street by providing opportunity for the crosswalk across Broad Street at Camp Street to be moved north to the south side of Chestnut Street. Construct overhead lane use signs for southbound Broad Street to give motorists advance warning of the proper lanes to use. Terminate the second lane southbound at South Street, where many buses turn right. Prohibit all parking on the west side of Broad Street between Lincoln Park eastbound and South Street.
● The near-side bus stop on Broad Street southbound at Lincoln Park westbound obstructs the right-hand turn lane, reducing capacity and forcing sudden and hazardous lane changes by vehicles.	● Relocate the near-side bus stop around the corner to the right on Lincoln Park where, with three lanes available to receive two lanes of traffic, there will be no obstruction of traffic by stopped buses. Provide a far-side loading bay for Broad Street through buses southbound to leave the curb lane here open for through traffic across the intersection.

Problems	Recommendations
• The present angle parking on Lincoln Park westbound is not acceptable on a TOPICS network street because of the inherent safety hazards. Also, an excessive pavement width on Lincoln Park exists.	• Provide an enclosed off-street angle parking area on the south side of Lincoln Park westbound. Sufficient width is available for three lanes of through traffic, a more than adequate amount for the demand on this street.

FIGURE 23

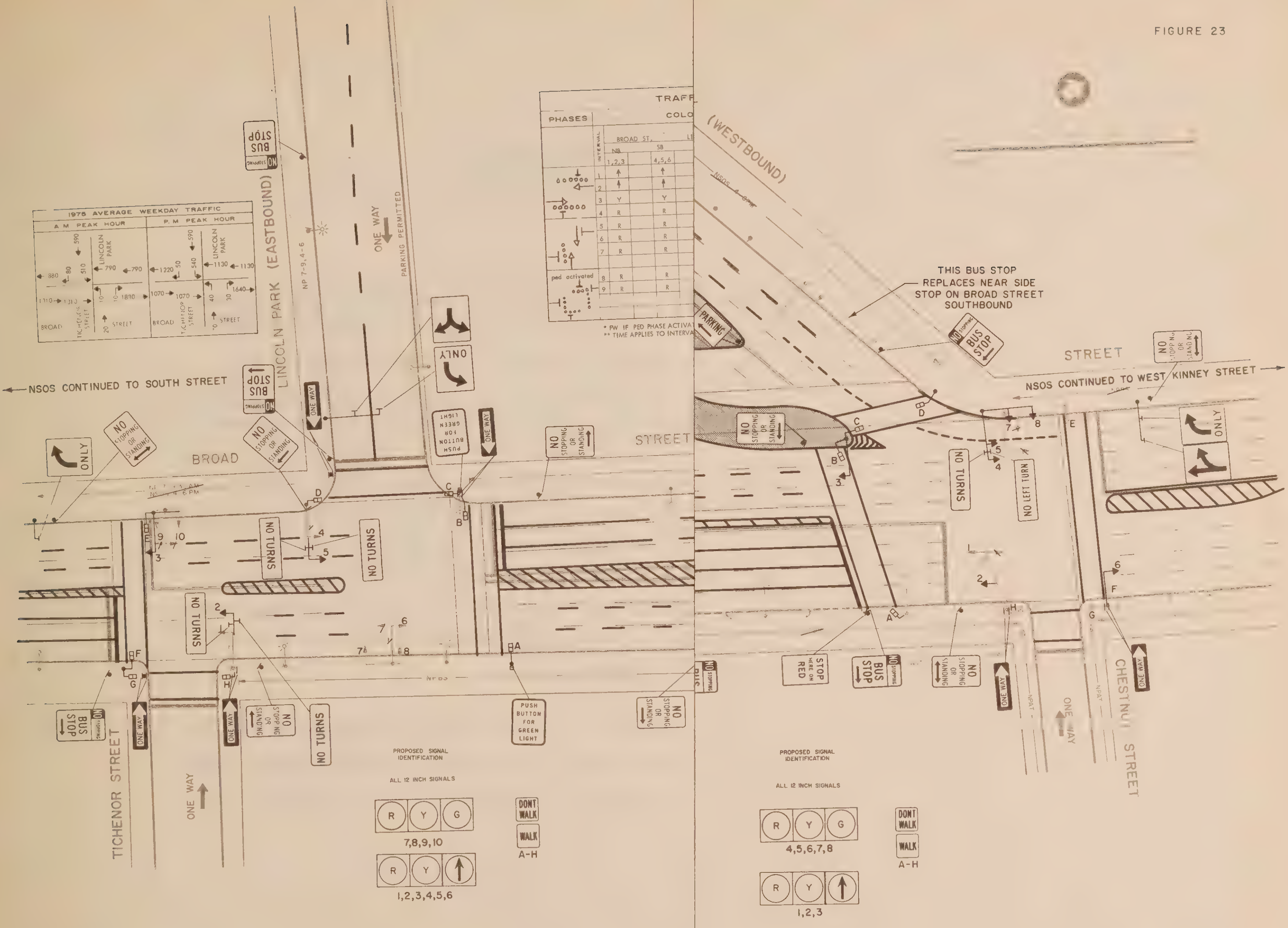
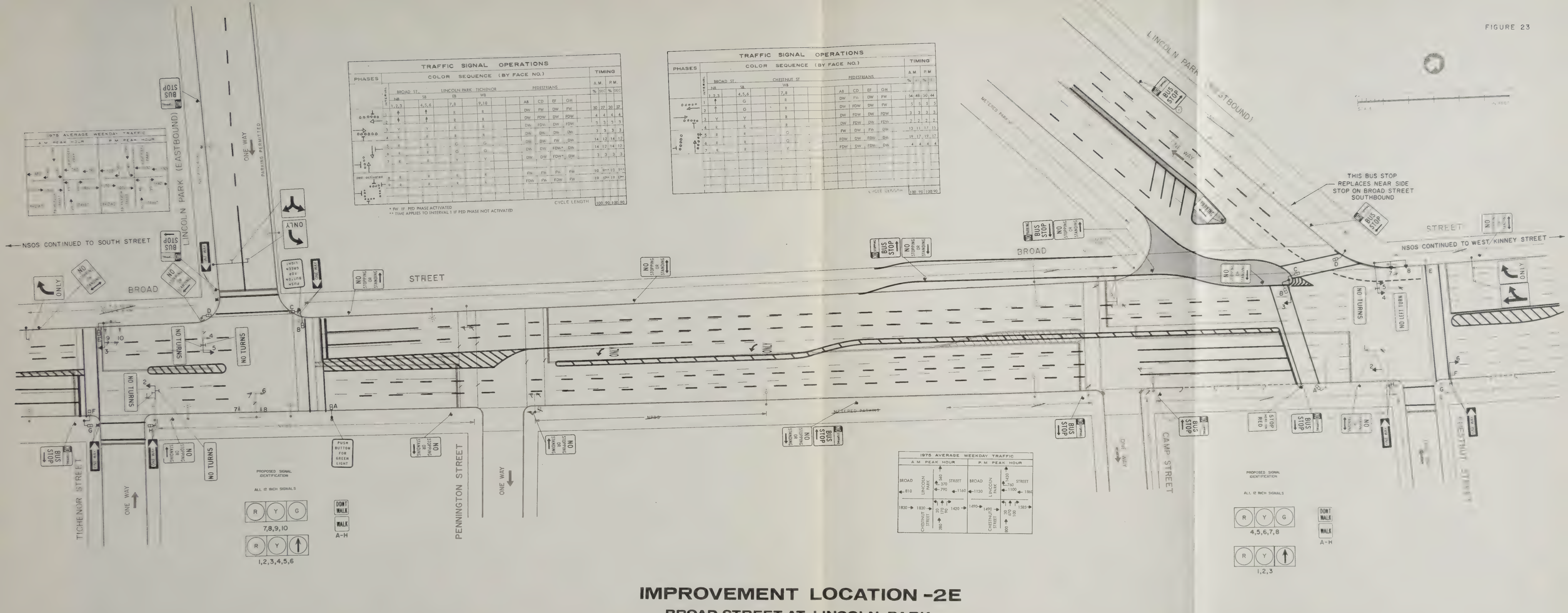

1975 AVERAGE WEEKDAY TRAFFIC
A M PEAK HOUR
P. M PEAK HOUR
590
80
510
880
790
790
1310
1310
10
10
1830
20
LINCOLN PARK
BROAD
TICHENOR STREET
STREET
590
50
540
1220
1130
1130
1070
1070
40
30
1640
70
LINCOLN PARK (EASTBOUND)
NP 7-9, 4-6
ONE WAY
PARKING PERMITTED
NO STOPPING BUS STOP
ONLY
NSOS CONTINUED TO SOUTH STREET
NO STOPPING OR STANDING
BROAD
STREET
PUSH BUTTON FOR GREEN LIGHT
NO TURNS
NO LEFT TURN
TICHENOR STREET
NPBS
PROPOSED SIGNAL IDENTIFICATION
ALL 12 INCH SIGNALS
R Y G
7,8,9,10
R Y
1,2,3,4,5,6
DONT WALK
WALK
A-H
TRAFF
COLO
PHASES
INTERVAL
BROAD ST.
NB
SB
1,2,3
4,5,6
1
2
3 Y Y
4 R R
5 R R
6 R R
7 R R
ped activated
8 R R
9 R R
* PW IF PED PHASE ACTIVAT
** TIME APPLIES TO INTERVA
(WESTBOUND)
NSOS
PARKING
THIS BUS STOP REPLACES NEAR SIDE STOP ON BROAD STREET SOUTHBOUND
STREET
NSOS CONTINUED TO WEST KINNEY STREET
STOP HERE ON RED
NPAT
CHESTNUT STREET
4,5,6,7,8
1,2,3
A B C D E F G H

FIGURE 23



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	BROAD ST. NB 1,2,3	BROAD ST. SB 4,5,6	LINCOLN PARK EB 7,8	TICHENOR WB 9,10	PEDESTRIANS AB	CD	EF	GH	A.M. %	A.M. SEC	P.M. %	P.M. SEC
	1	↑	↑	R	R	DW	FW	DW	FW	30	27	30	27
	2	↑	↑	R	R	DW	FDW	DW	FDW	4	4	4	4
	3	Y	Y	R	R	DW	FDW	DW	FDW	3	3	3	3
	4	R	R	R	R	DW	DW	DW	DW	3	3	3	3
	5	R	R	G	G	DW	DW	FW	DW	14	12	14	12
	6	R	R	G	G	DW	DW	FDW*	DW	14	12	14	12
	7	R	R	Y	Y	DW	DW	FDW*	DW	3	3	3	3
ped activated	8	R	R	R	R	FW	FW	FW	FW	10	9**	10	9**
	9	R	R	R	R	FDW	FW	FDW	FW	19	17**	19	17**
									CYCLE LENGTH	100	90	100	90

* FW IF PED PHASE ACTIVATED
** TIME APPLIES TO INTERVAL 1 IF PED PHASE NOT ACTIVATED

TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	BROAD ST. NB 1,2,3	BROAD ST. SB 4,5,6	CHESTNUT ST WB 7,8	PEDESTRIANS AB	CD	EF	GH	A.M. %	A.M. SEC	P.M. %	P.M. SEC
	1	↑	G	R	DW	FW	DW	FW	54	48	50	44
	2	↑	G	R	DW	FDW	DW	FW	5	5	5	5
	3	Y	Y	R	DW	FDW	DW	FDW	3	3	3	3
	4	R	R	R	DW	FDW	DW	FDW	2	2	2	2
	5	R	R	G	FW	DW	FW	DW	13	11	17	15
	6	R	R	G	FDW	DW	FDW	DW	19	17	19	17
	7	R	R	Y	FDW	DW	FDW	DW	4	4	4	4
								CYCLE LENGTH	100	90	100	90

IMPROVEMENT LOCATION -2E

BROAD STREET AT LINCOLN PARK

IMPROVEMENT CORRIDOR 3
WASHINGTON STREET-UNIVERSITY AVENUE
FROM CLINTON AVENUE TO COURT STREET

Existing Conditions

Washington Street presently carries one-way northbound traffic from Clinton Avenue at the western end of Lincoln Park to Broad Street at the northern end of Washington Park. University Avenue, an adjacent parallel roadway, functions one-way southbound from Broad Street to West Kinney Street (i.e., approximately three city blocks north of Clinton Avenue), where traffic must turn right or left in order to transfer to High Street or Broad Street for southbound movement.

The section of Washington Street between Clinton Avenue and West Kinney Street is 52 feet wide and consists of two travel lanes and parallel parking along both curbs. Parking is prohibited during peak traffic hours to eliminate friction between moving and parked vehicles and to increase capacity. Field reconnaissance and analysis of data collected on this section of Washington Street indicate that revision to two-way flow is possible. Such revision would eliminate the need for all southbound vehicles to turn at West Kinney Street and also would create increased efficiency of the usage of Washington Street.

Adoption of two-way flow on Washington Street would attract 350 and 500 southbound vehicles during the a.m. and p.m. peaks, respectively, to the segment south of West Kinney Street. These same vehicles would no longer utilize either High Street or Broad Street and, therefore, would reduce the existing congestion on these streets.

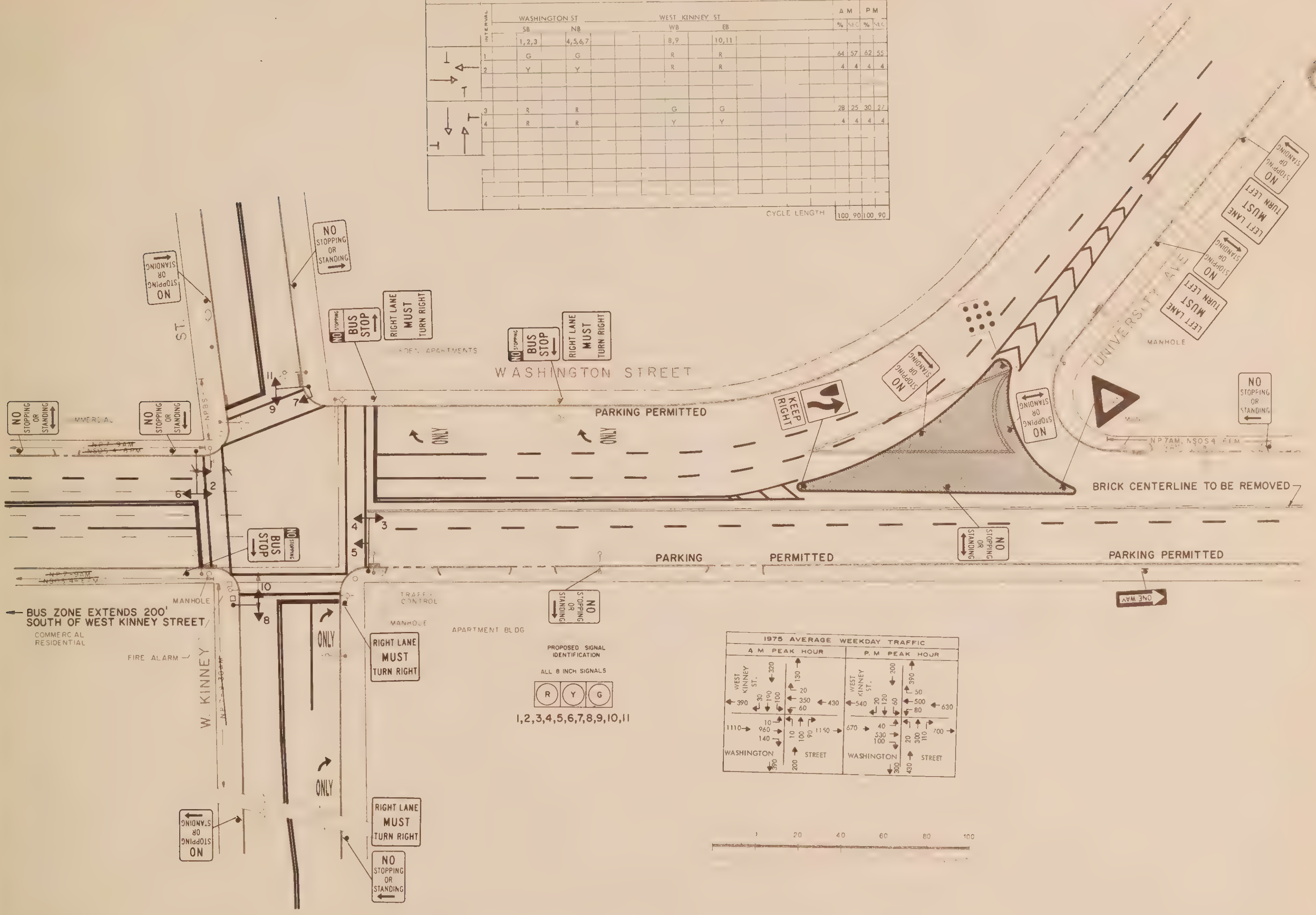
Problems	Recommendations
The existing pavement surface is inadequate to accommodate major street traffic.	Resurface Washington Street from Clinton Avenue to Court Street, and remove the existing brick centerline for clearer lane demarcation.
Existing signals, signing, and markings will be improper for the proposed two-way traffic on Washington Street.	Replace the existing parking and turn restriction signs and paint stripe lane lines as indicated on the intersection improvement plans. Add southbound signal indications at Washington and Spruce Streets.
An increase in left turns may be expected from Court Street westbound to University Avenue southbound with the proposed circulation improvements.	Narrow the Court Street median sufficiently to add another lane for left-turn traffic.
University Avenue is currently a stop street at Court Street.	Erect stop signs on Court Street at this intersection and remove the stop sign from University Avenue. Traffic volumes are not expected to be heavy enough to warrant a signal.

IMPROVEMENT LOCATION 3A

WASHINGTON STREET AND WEST KINNEY STREET

Problems	Recommendations
• Revision of the Washington Street flow pattern from one- to two-way traffic south of University Avenue requires modification of existing control devices.	• Install new poles, mast arms and signal heads to provide two properly located signals for all entering traffic. Remove existing one-way signing on the south Washington Street approach.
• The lane geometry at the junction of University and Washington, together with existing parking practices, combine to reduce the efficiency of the north Washington-University approach.	• Eliminate parking in the center of the roadway around the Star Ledger Building through construction of a concrete island with paint striping extending to the intersection. Provide a roadway for the U-turn movement from southbound University Avenue to northbound Washington Street.

FIGURE 24



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	WASHINGTON ST SB 1,2,3	WASHINGTON ST NB 4,5,6,7	WEST KINNEY ST WB 8,9	WEST KINNEY ST EB 10,11	TIMING A M %	TIMING A M SEC	TIMING P M %	TIMING P M SEC
	1	G	G	R	R	64	57	62	55
	2	Y	Y	R	R	4	4	4	4
	3	R	R	G	G	28	25	30	27
	4	R	R	Y	Y	4	4	4	4
CYCLE LENGTH						100	90	100	90

— BUS ZONE EXTENDS 200' SOUTH OF WEST KINNEY STREET

IMPROVEMENT LOCATION - 3A

WASHINGTON STREET AND WEST KINNEY STREET

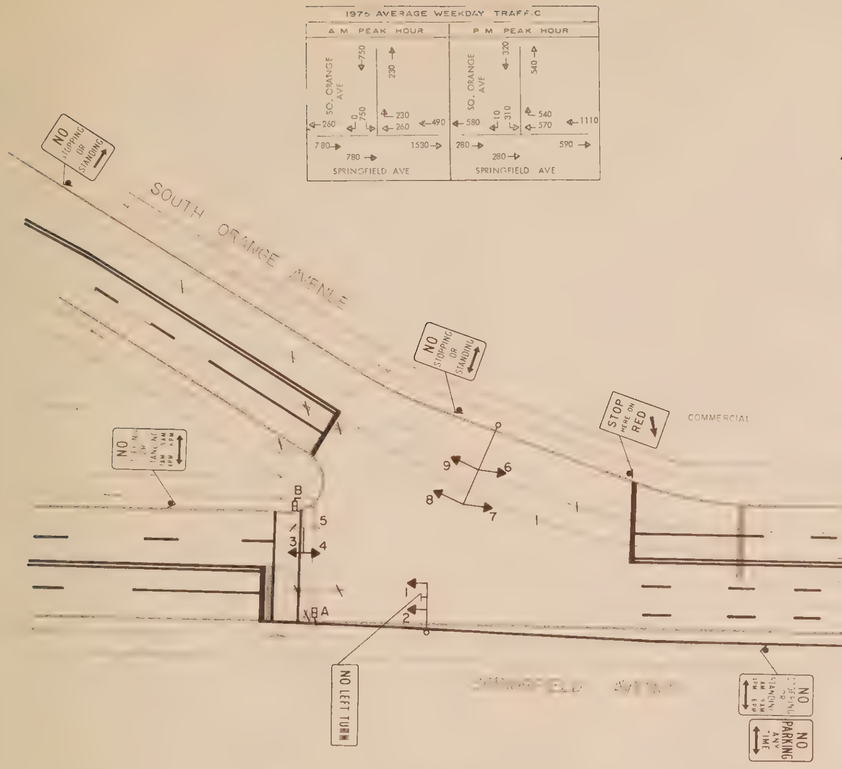
IMPROVEMENT CORRIDOR 4
SPRINGFIELD AVENUE AND MARKET STREET
WASHINGTON STREET TO SOUTH ORANGE AVENUE

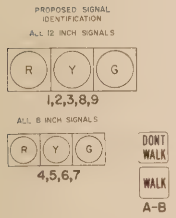
Existing Conditions

The east-west arterial of Springfield Avenue and Market Street is a major route into Newark from Irvington, Maplewood and beyond. The high percentage of commuters causes significant directional variation and high peak-hour volumes. This route is also a very heavy transit corridor; current plans call for construction of a subway under Springfield Avenue and connection with the existing Newark City Subway.

A key section of the Springfield Avenue-Market Street route exists between South Orange Avenue and Washington Street, where two additional major arterial routes (South Orange Avenue and West Market Street) are utilized for distribution into the Newark CBD. Other major streets intersect at various angles to form a complex and highly congested network. Reversible lane operation on Springfield Avenue between South Orange Avenue and High Street has been discontinued by the Essex County Highway Department. Initiation of this reversing feature in conjunction with the reversible operation on Market Street between Washington Street and Mulberry Street would be complicated since both function away from each other in the off-peak period.

Problems	Recommendations
● The Springfield Avenue reversible lane operation cannot function adequately due to its insufficient width and lack of coordination with lane markings east of High Street.	● Institute permanent operation of three lanes inbound and two lanes outbound to best provide for traffic demand and avoid the complications of terminating a reversible lane system. Widen Springfield Avenue by two feet to accommodate five lanes.
● Expansive pavement and the non-signalization of the intersection of Market Street and Springfield Avenue prohibits the intersection from functioning at its full capacity.	● Proper signalization and channelization will greatly improve traffic flow and increase safety at this intersection.
● Reports of the large number of accidents at University Avenue and Market Street indicate that most of the accidents are of the rear-end or right-angle type, which signifies that traffic signals have a lack of vehicle control.	● Install additional signal faces, including the use of 12-inch lenses and all-red clearance phase for University Avenue. Provide for an exclusive left-turn lane on Market Street to decrease accident frequency.
● The very high volume of left turns from Market Street to Washington Street requires two turning lanes with proper signs and markings with simultaneous coordination with the reversible lane east of Washington Street.	● Provide a four-lane approach on Market Street eastbound by widening nine feet on the south side through the Washington Street intersection to permit an exclusive left-turn lane, an optional left-turn lane and two through lanes. Provide special overhead variable matrix signing to designate proper lane use.





TRAFFIC SIGNAL OPERATIONS

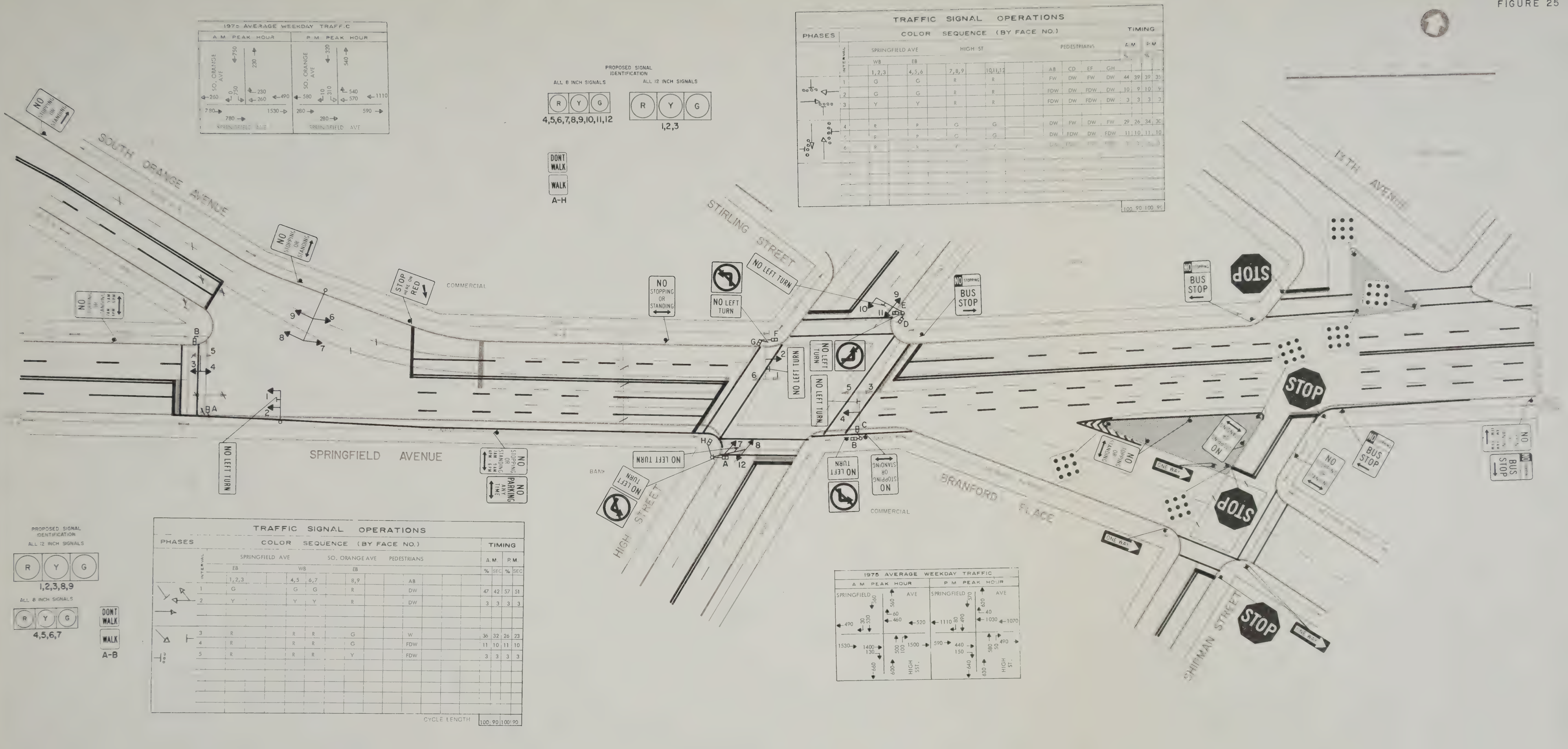
COLOR SEQUENCE (BY FACE NO.)

PHASES	INTERVAL	SPRINGFIELD AVE EB 1,2,3	SPRINGFIELD AVE WB 4,5	SPRINGFIELD AVE WB 6,7	SO. ORANGE AVE EB 8,9	PEDESTRIANS AB	TIMING A M %	TIMING A M	TIMING P M %	TIMING P M
	1	G	G	G	R	DW	47	42	57	51
	2	Y	Y	Y	R	DW	3	3	3	3
	3	R	R	R	G	W	36	32	26	23
	4	R	R	R	G	FDW	11	10	11	10
	5	R	R	R	Y	FDW	3	3	3	3
						CYCLE LENGTH	100	90	100	90

IM

SPRINGFIELD

Problems	Recommendations
● The Springfield Avenue reversible lane operation cannot function adequately due to its insufficient width and lack of coordination with lane markings east of High Street.	● Institute permanent operation of three lanes inbound and two lanes outbound to best provide for traffic demand and avoid the complications of terminating a reversible lane system. Widen Springfield Avenue by two feet to accommodate five lanes.
● Expansive pavement and the non-signalization of the intersection of Market Street and Springfield Avenue prohibits the intersection from functioning at its full capacity.	● Proper signalization and channelization will greatly improve traffic flow and increase safety at this intersection.
● Reports of the large number of accidents at University Avenue and Market Street indicate that most of the accidents are of the rear-end or right-angle type, which signifies that traffic signals have a lack of vehicle control.	● Install additional signal faces, including the use of 12-inch lenses and all-red clearance phase for University Avenue. Provide for an exclusive left-turn lane on Market Street to decrease accident frequency.
● The very high volume of left turns from Market Street to Washington Street requires two turning lanes with proper signs and markings with simultaneous coordination with the reversible lane east of Washington Street.	● Provide a four-lane approach on Market Street eastbound by widening nine feet on the south side through the Washington Street intersection to permit an exclusive left-turn lane, an optional left-turn lane and two through lanes. Provide special overhead variable matrix signing to designate proper lane use.



TRAFFIC SIGNAL OPERATIONS

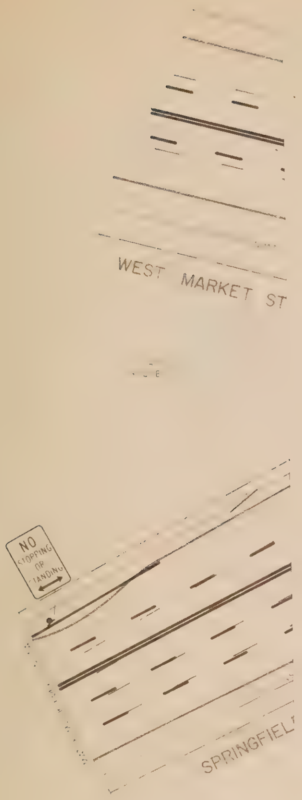
PHASES	INTERVAL	SPRINGFIELD AVE WB 1,2,3	SPRINGFIELD AVE EB 4,5,6	HIGH ST 7,8,9	HIGH ST 10,11,12	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	TIMING A M %	TIMING A M	TIMING P M %	TIMING P M
	1	G	G	R	R	FW	DW	FW	DW	44	39	39	35
	2	G	G	R	R	FDW	DW	FDW	DW	10	9	10	9
	3	Y	Y	R	R	FDW	DW	FDW	DW	3	3	3	3
	4	R	R	G	G	DW	FW	DW	FW	29	26	34	30
	5	R	R	G	G	DW	FDW	DW	FDW	11	10	11	10
	6	R	R	Y	Y	[illegible]	[illegible]	[illegible]	[illegible]	3	3	[illegible]	3
										100	90	100	9

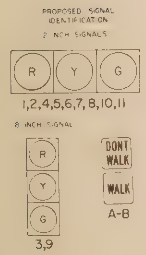
TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	SPRINGFIELD AVE EB 1,2,3	SPRINGFIELD AVE WB 4,5	SPRINGFIELD AVE WB 6,7	SO. ORANGE AVE EB 8,9	PEDESTRIANS AB	TIMING A.M. %	TIMING A.M. SEC	TIMING P.M. %	TIMING P.M. SEC
	1	G	G	G	R	DW	47	42	57	51
	2	Y	Y	Y	R	DW	3	3	3	3
	3	R	R	R	G	W	36	32	26	23
	4	R	R	R	G	FDW	11	10	11	10
	5	R	R	R	Y	FDW	3	3	3	3
						CYCLE LENGTH	100	90	100	90

IMPROVEMENT LOCATION - 4 A

SPRINGFIELD AVENUE, SOUTH ORANGE AVENUE TO 13th STREET


WEST MARKET ST
NO STOPPING OR STANDING
SPRINGFIEL


PROPOSED SIGNAL IDENTIFICATION
2 INCH SIGNALS
R
Y
G
1,2,4,5,6,7,8,10,11
8 INCH SIGNAL
R
Y
G
3,9
DONT WALK
WALK
A-B

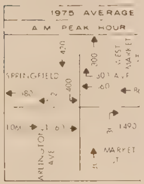
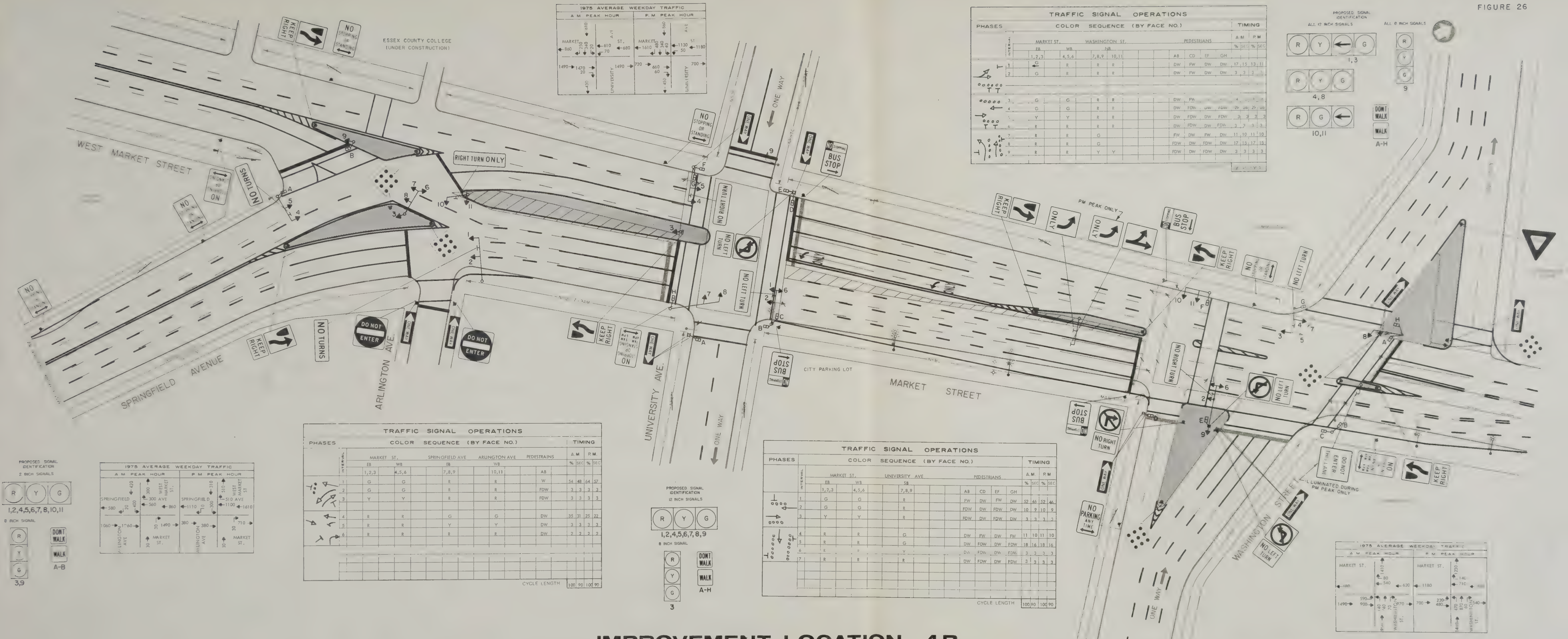

1975 AVERAGE
A M PEAK HOUR
SPRINGFIELD
420
300
400
60
1490
WEST MARKET ST
ARLINGTON AVE
MARKET ST

FIGURE 26



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	MARKET ST. EB 1,2,3	MARKET ST. WB 4,5,6	WASHINGTON ST. NB 7,8,9	WASHINGTON ST. NB 10,11	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	TIMING A.M. %	TIMING A.M. SEC	TIMING P.M. %	TIMING P.M. SEC
	1	G ←	R	R	R	DW	FW	DW	DW	17	15	13	11
	2	G	R	R	R	DW	FW	DW	DW	3	3	3	[illegible]
	3	G	G	R	R	DW	FW	[illegible]	[illegible]	4	[illegible]	5	[illegible]
	4	G	G	R	R	DW	FDW	DW	FDW	27	26	27	26
	5	Y	Y	R	R	DW	FDW	DW	FDW	3	3	3	3
	6	R	R	R	R	DW	FDW	DW	FDW	3	3	3	3
	7	R	R	G		FW	DW	FW	DW	11	10	11	10
	8	R	R	G		FDW	DW	FDW	DW	17	15	17	15
	9	R	R	Y	Y	FDW	DW	FDW	DW	3	3	3	3

TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	MARKET ST. EB 1,2,3	MARKET ST. WB 4,5,6	SPRINGFIELD AVE EB 7,8,9	ARLINGTON AVE WB 10,11	PEDESTRAINS AB	TIMING A.M. %	TIMING A.M. SEC	TIMING P.M. %	TIMING P.M. SEC
	1	G	G	R	R	W	54	48	64	57
	2	G	G	R	R	FDW	3	3	3	3
	3	Y	Y	R	R	FDW	3	3	3	3
	4	R	R	G	G	DW	35	31	25	22
	5	R	R	Y	Y	DW	3	3	3	3
	6	R	R	R	R	DW	2	2	2	2
						CYCLE LENGTH	100	90	100	90

TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	MARKET ST. EB 1,2,3	MARKET ST. WB 4,5,6	UNIVERSITY AVE SB 7,8,9	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	TIMING A.M. %	TIMING A.M. SEC	TIMING P.M. %	TIMING P.M. SEC
	1	G	G	R	FW	DW	FW	DW	52	46	52	46
	2	G	G	R	FDW	DW	FDW	DW	10	9	10	9
	3	Y	Y	R	FDW	DW	FDW	DW	3	3	3	3
	4	R	R	G	DW	FW	DW	FW	11	10	11	10
	5	R	R	G	DW	FDW	DW	FDW	18	16	18	16
	6	R	R	Y	DW	FDW	DW	FDW	3	3	3	3
	7	R	R	R	DW	FDW	DW	FDW	3	3	3	3
								CYCLE LENGTH	100	90	100	90

IMPROVEMENT LOCATION - 4B

MARKET STREET, SPRINGFIELD AVENUE TO WASHINGTON STREET

IMPROVEMENT CORRIDOR 5

CENTRAL AVENUE, WEST MARKET STREET TO TWELFTH STREET

Existing Conditions

Central Avenue (Essex County Route 508) is a major east-west arterial 58 feet in width, offering two travel lanes in each direction for vehicles desiring access to the CBD or to East Orange and points west. The segment of roadway under study experiences especially heavy traffic during the morning and evening peak hours, generated by the activity in the CBD and also the presence of the Motor Club of America building and the College of Medicine and Dentistry of New Jersey. The arterial also serves as a primary bus transit route, with the numbers 23, 24 and 44 bus lines (Transport of New Jersey) serving commuters from Newark, East Orange and beyond.

Land use along much of this section is commercial, with intermittent institutional and residential uses. Parking is allowed along both curbsides, both for deliveries and to serve the existing residences.

Central Avenue and West Market Street is a major capacity problem area that has received special treatment as described under Spot Improvement 5A.

Problem	Recommendation
• A very high accident frequency of right angle accidents was experienced at the unsignalized intersections of Seventh, Ninth and Eleventh Streets. Cars experience considerable difficulty in entering and crossing Central Avenue from side streets due to heavy traffic on Central Avenue.	• An increase in the number of signals is unwarranted and additional signals would have an adverse affect upon travel along Central Avenue. It is not possible to make circulation changes without greatly inconveniencing residents of the area; therefore, it was not possible to develop a satisfactory improvement program for this area.

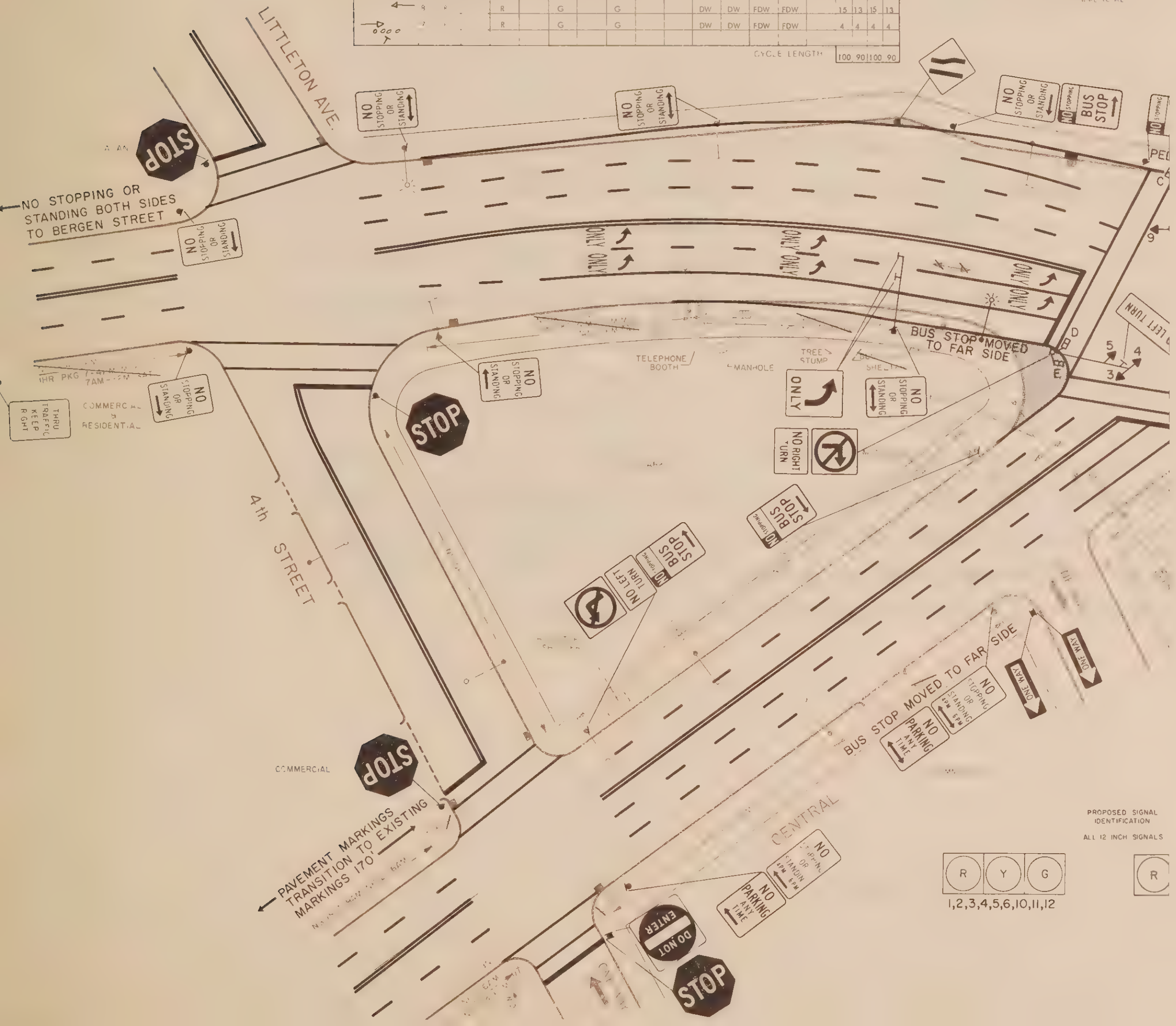
IMPROVEMENT LOCATION 5A

CENTRAL AVENUE AND WEST MARKET STREET

Problems	Recommendations
• A high frequency of rear-end and right-angle collisions involving personal injury were reported from 1966 to 1968.	• Change to a three-phase operation to separate conflicting movements and reduce queuing. Provide two left-turn lanes on the northbound approach and three lanes on the southbound approach to reduce the number of stopped vehicles and rear-end collision potential.
• Heavy left-turn conflicts on a two-phase signal operation cause extensive queuing on the West Market Street approaches.	• Change to a three-phase operation as described above.
• Near-side bus stops, "No Parking" restrictions at some bus stops, and illegal parking cause capacity and turning movement problems.	• Move the near-side bus stops on Central Avenue and on the West Market Street approaches to the far-side locations. Create an exclusive bus lane at the new southbound West Market Street bus stop. Relocate these stops plus change the signing to "No Stopping Bus Zone" to increase traffic flow and facilitate turning movements.
• The approaches are extremely wide and without channelization, creating a vehicular hazard. The long crossing distance and absence of signals for pedestrians cause another hazard.	• Provide improved pavement markings and introduce pedestrian signals and crosswalks for increased safety. Prohibit right turns from Market Street since these turns can be more conveniently made from adjacent streets, reducing pedestrian conflicts and increasing vehicular capacity.

TRAFFIC SIGNAL OPERATIONS

PHASES / INTERVAL	CENTRAL AVE. WB 1,2,3	CENTRAL AVE. EB 4,5,6	WEST MARKET STREET NB 7,8,9	WEST MARKET STREET SB 10,11,12	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	TIMING A M %	TIMING A M T	TIMING P M %	TIMING P M T
1	G	G	R	R	FW	FW	DW	DW	30	[illegible]	[illegible]	[illegible]
2	G	G	R	R	FDW	FDW	DW	DW	4	12	4	12
3	Y	Y	R	R	FDW	FDW	DW	DW	4	4	4	4
4	R	R	R	R	FDW	FDW	DW	DW	[illegible]	[illegible]	[illegible]	2
5	R	R	G ←	R	DW	DW	FW	DW	6	6	34	30
6	R	R	G	R	DW	DW	FW	DW	2	2	2	2
7	R	R	G	G	DW	DW	FW	FW	14	12	12	11
8	R	R	G	G	DW	DW	FDW	FDW	15	13	15	13
9	R	R	G	G	DW	DW	FDW	FDW	4	4	4	4
CYCLE LENGTH									100	90	100	90



IMPROVEMENT LOCATION 5A

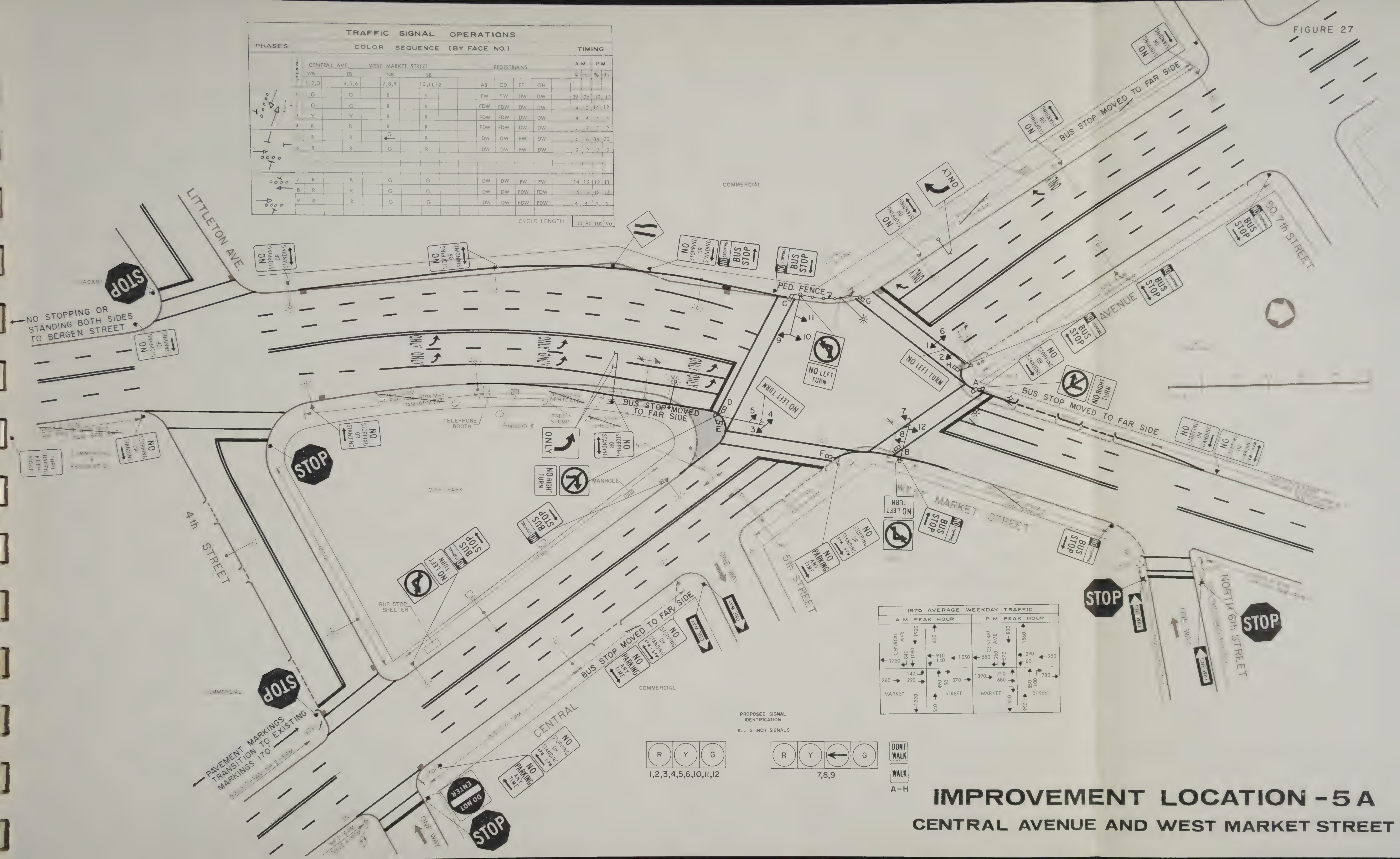
CENTRAL AVENUE AND WEST MARKET STREET

Problems	Recommendations
• A high frequency of rear-end and right-angle collisions involving personal injury were reported from 1966 to 1968.	• Change to a three-phase operation to separate conflicting movements and reduce queuing. Provide two left-turn lanes on the northbound approach and three lanes on the southbound approach to reduce the number of stopped vehicles and rear-end collision potential.
• Heavy left-turn conflicts on a two-phase signal operation cause extensive queuing on the West Market Street approaches.	• Change to a three-phase operation as described above.
• Near-side bus stops, "No Parking" restrictions at some bus stops, and illegal parking cause capacity and turning movement problems.	• Move the near-side bus stops on Central Avenue and on the West Market Street approaches to the far-side locations. Create an exclusive bus lane at the new southbound West Market Street bus stop. Relocate these stops plus change the signing to "No Stopping Bus Zone" to increase traffic flow and facilitate turning movements.
• The approaches are extremely wide and without channelization, creating a vehicular hazard. The long crossing distance and absence of signals for pedestrians cause another hazard.	• Provide improved pavement markings and introduce pedestrian signals and crosswalks for increased safety. Prohibit right turns from Market Street since these turns can be more conveniently made from adjacent streets, reducing pedestrian conflicts and increasing vehicular capacity.

FIGURE 27

IMPROVEMENT LOCATION - 5 A

CENTRAL AVENUE AND WEST MARKET STREET



TRAFFIC SIGNAL OPERATIONS

PHASES (INTERVAL)	CENTRAL AVE. WB 1,2,3	CENTRAL AVE. EB 4,5,6	WEST MARKET STREET NB 7,8,9	WEST MARKET STREET SB 10,11,12	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	TIMING A M %	TIMING A M [illegible]	TIMING P M %	TIMING P M [illegible]
1	G	G	R	R	FW	FW	DW	DW	39	35	13	12
2	G	G	R	R	FDW	FDW	DW	DW	14	12	14	12
3	Y	Y	R	R	FDW	FDW	DW	DW	4	4	4	4
4	R	R	R	R	FDW	FDW	DW	DW	2	2	2	2
5	R	R	G ←	R	DW	DW	FW	DW	6	6	34	30
6	R	R	G	R	DW	DW	FW	DW	2	2	2	2
7	R	R	G	G	DW	DW	FW	FW	14	12	12	11
8	R	R	G	G	DW	DW	FDW	FDW	15	13	15	13
9	R	R	G	G	DW	DW	FDW	FDW	4	4	4	4
CYCLE LENGTH									100	90	100	90

IMPROVEMENT CORRIDOR 6

BROAD STREET FROM CENTRAL AVENUE TO CLAY STREET

Existing Conditions

Broad Street is the major north-south route through the Central Business District of Newark. The most critical section of this study corridor in terms of capacity lies between Central Avenue and Clay Street. Roadway width varies from 90 feet at Central Avenue to only 64 feet at Clay Street. Very heavy traffic flows are experienced through this area between downtown Newark and the northern and northwestern suburbs. The street also acts as a major bus transit corridor, as well as the route of heavy pedestrian traffic (includes many rail commuters) from Lackawanna Avenue southward. To increase traffic capacity on the roadway, a system of reversible lanes was initiated in 1968, by which the two center lanes would operate flexibly southbound in the a.m. peak, northbound in the p.m. peak, and one in each direction in the off-peak periods. The offset centerline is marked by traffic cones placed during the morning and evening rush hours. Parking regulations vary along this section on both curbsides; on the west side "No Parking Any Time" and "No Stopping 4-6 PM" signs exist from Central to Washington and Lackawanna to Clay. All other segments are enforced by "No Parking 7-9 AM" and "No Standing 4-6 PM" regulations.

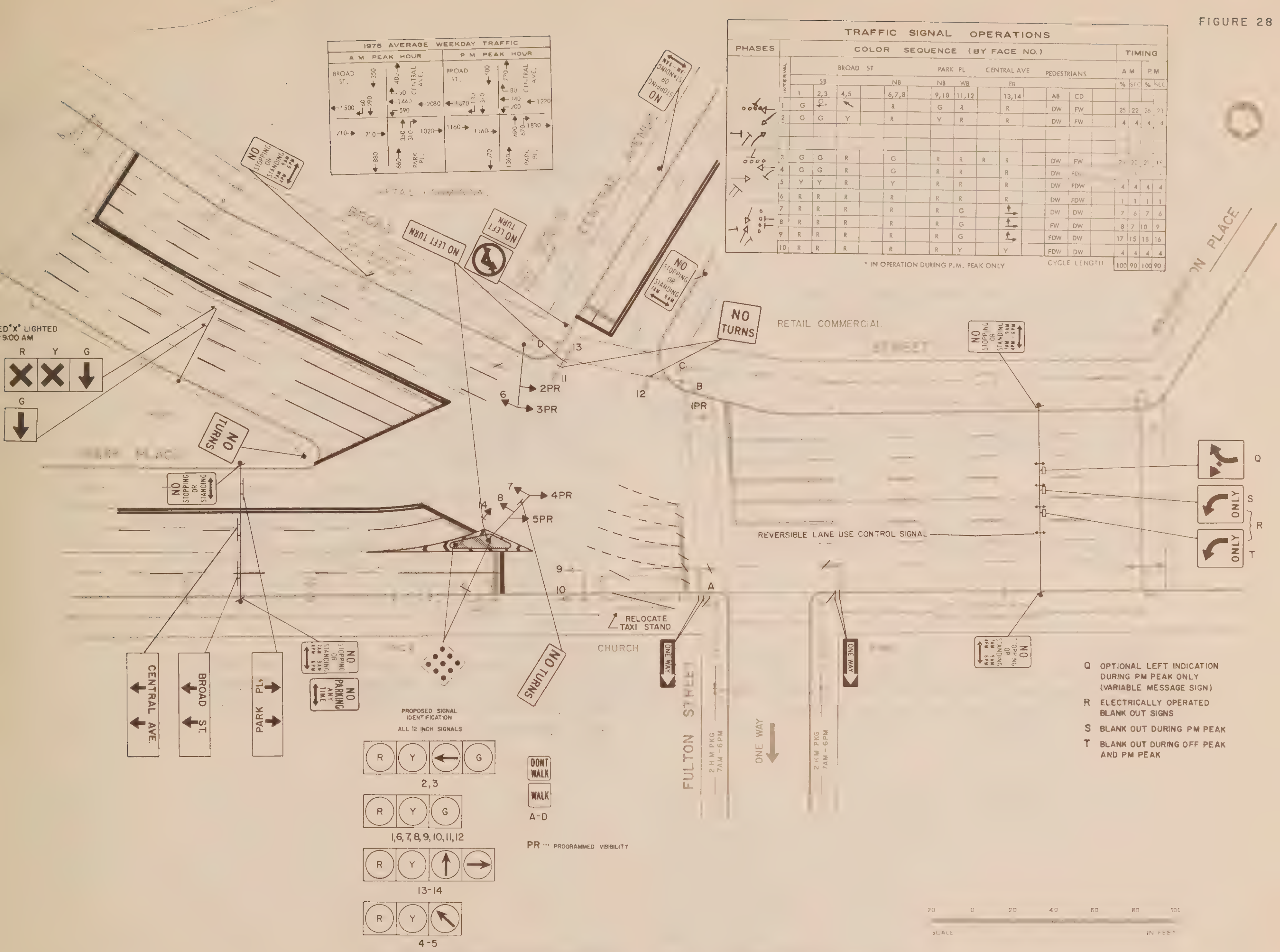
Problems	Recommendations
● Manual placement of traffic-dividing cones does not achieve sufficient demarcation of travel lanes.	● Provide overhead lane use control signs for clear definition of a more permanent reversible lane installation.
● Intersection with Orange Street experiences severe accident and capacity problems. A particular shortcoming is the inability to handle very heavy left turns from Broad Street northbound to Orange Street westbound. Lack of available right-of-way and dense development adjacent to the intersection also hinder capacity improvements.	● Possible relocation of the problem left turn to Lackawanna Avenue in conjunction with a new connector between Lackawanna Avenue and Orange Street for westbound traffic. A program for this location could not be developed, however, under the immediate action concept of TOPICS.
● Nonuniformity of signing exists, particularly those referring to parking restrictions.	● Provide uniform "NO STOPPING OR STANDING" restriction signs along the entire corridor in conjunction with increased enforcement which includes towing away of illegally stopped or parked vehicles to create more desirable traffic flow.
● Lane lines fade very rapidly causing driver confusion, and the existing brick centerline remains visible at all times detering use of the extra reversible lane in peak hours.	● Use thermoplastic lane markings and remove and pave over brick centerline.

IMPROVEMENT LOCATION 6A

BROAD STREET AND CENTRAL AVENUE

Problems	Recommendations
• During a.m. and p.m. peak periods, both approaches of Broad Street and the Park Place approach must accommodate highly unbalanced directional flows of traffic.	• Modernize the present reversible lane operation by using overhead lane-use control signals, and proper standard pavement markings to accommodate the unbalanced peak period traffic demands.
• The heavy left-turn movements from Broad Street to Park Place during the a.m. peak period cause undue delay and congestion to all intersection movements, especially the northbound Broad Street approach.	• Provide double exclusive left-turn lanes on the southbound Broad Street approach during the a.m. peak period to increase capacity. This improvement also will allow separate signal control for left-turning vehicles to eliminate conflicts between left-turning movements and opposing through movements.
• The skewed Park Place approach and the existence of the offset fifth leg of Fulton Street results in a large intersection area that increases vehicle clearance time, causing confusion and congestion.	• Provide a new phasing with a double clearance interval to increase the intersection capacity by overlapping the Broad Street southbound traffic. It will also provide adequate clearance time, aiding in the reduction of congestion.
• Northbound traffic on Broad Street experiences unexpected green interval conflicts with northbound Park Place traffic merging into Broad Street.	• Institute a four-phase multi-dial, pretimed control to alternately assign the right-of-way to each major movement and eliminate all direct and merging conflicts.
• Existing traffic signal layout and indications tend to confuse northbound motorists on Broad Street and Park Place.	• Rearrange signal heads and replace selected signal indications with programmed visibility indications to increase signal visibility and eliminate conflicting or distracting signal indications.

FIGURE 28



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	BROAD ST SB 1	BROAD ST SB 2,3	BROAD ST SB 4,5		BROAD ST NB 6,7,8		PARK PL NB 9,10	PARK PL WB 11,12		CENTRAL AVE EB 13,14		PEDESTRIANS AB	PEDESTRIANS CD		TIMING A M %	TIMING A M SEC	TIMING P M %	TIMING P M SEC
	1	G	G ←	↖		R		G	R		R		DW	FW		25	22	26	23
	2	G	G	Y		R		Y	R		R		DW	FW		4	4	4	4
	3	G	G	R		G		R	R	R	R		DW	FW		[illegible]	[illegible]	21	18
	4	G	G	R		G		R	R		R		DW	FDW		[illegible]	[illegible]	[illegible]	[illegible]
	5	Y	Y	R		Y		R	R		R		DW	FDW		4	4	4	4
	6	R	R	R		R		R	R		R		DW	FDW		1	1	1	1
	7	R	R	R		R		R	G		↑→		DW	DW		7	6	7	6
	8	R	R	R		R		R	G		↑→		FW	DW		8	7	10	9
	9	R	R	R		R		R	G		↑→		FDW	DW		17	15	18	16
	10	R	R	R		R		R	Y		Y		FDW	DW		4	4	4	4
														CYCLE LENGTH		100	90	100	90

* IN OPERATION DURING P.M. PEAK ONLY

IMPROVEMENT LOCATION - 6A

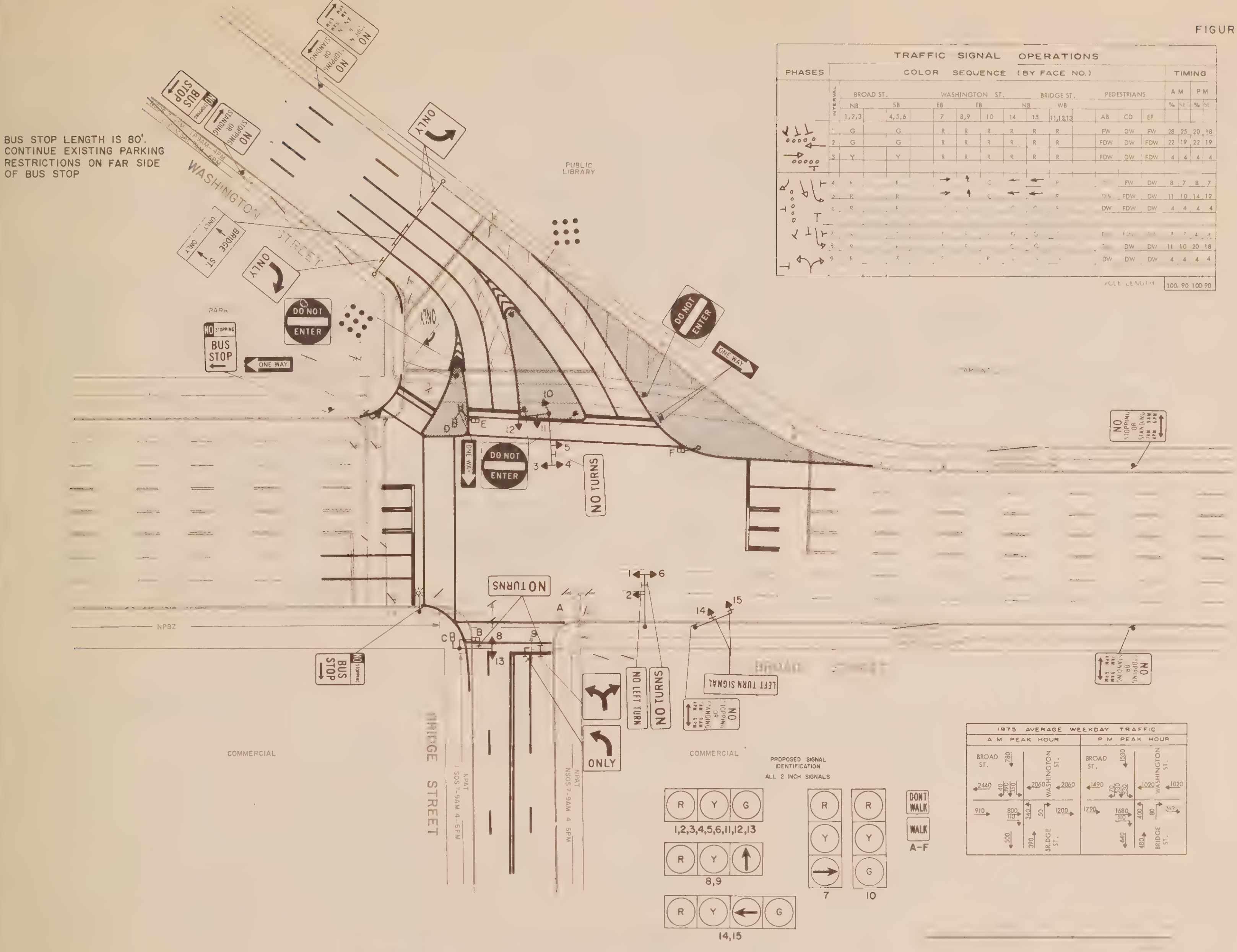
BROAD STREET AND CENTRAL AVENUE

IMPROVEMENT LOCATION 6B

BROAD STREET AND WASHINGTON STREET

Problems	Recommendations
● The wide approach of Washington Street results in a large area of conflict at the intersection and causes confusion for motorists.	● Construct concrete channelization to reduce the area of conflict and aid driver movements.
● Absence of lane line markings and lane use guide signs has added to traffic confusion and disorder.	● Install overhead lane use signs and lane line markings and symbol markings to clearly direct traffic movements and reduce traffic confusion and disorder.
● Serious conflicts with the opposing traffic make the left-turn movements from the Bridge Street approach difficult and hazardous.	● Provide an advance signal phase for the left-turn movement from the Washington Street approach and use this phase for pedestrians in the south crosswalk. Delay the green for Bridge Street to allow the pedestrians in the south crosswalk to largely clear the intersection.
● No pedestrian signal exists for the westerly crosswalk, which carries heavy pedestrian traffic during the peak hours.	● Install pedestrian signals for the westerly crosswalk to facilitate the heavy pedestrian movements during the peak hours and increase safety.

FIGURE 29



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	COLOR SEQUENCE (BY FACE NO.)											TIMING			
		BROAD ST.		WASHINGTON ST.			BRIDGE ST.			PEDESTRIANS			A M		P M	
		NB	SB	EB	EB		NB		WB				%	SEC	%	SEC
		1,2,3	4,5,6	7	8,9	10	14	15	11,12,13	AB	CD	EF				
	1	G	G	R	R	R	R	R	R	FW	DW	FW	28	25	20	18
	2	G	G	R	R	R	R	R	R	FDW	DW	FDW	22	19	22	19
	3	Y	Y	R	R	R	R	R	R	FDW	DW	FDW	4	4	4	4
	4	R	R	→	↑	G	←	←	R	[illegible]	FW	DW	8	7	8	7
	5	R	R	→	↑	G	←	←	R	DW	FDW	DW	11	10	14	12
	6	R	R	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	DW	FDW	DW	4	4	4	4
	7	R	[illegible]	[illegible]	[illegible]	[illegible]	G	G	[illegible]	[illegible]	FDW	[illegible]	8	7	4	4
	8	R	R	[illegible]	[illegible]	[illegible]	G	G	[illegible]	[illegible]	DW	DW	11	10	20	18
	9	R	R	R	[illegible]	R	[illegible]	[illegible]	[illegible]	DW	DW	DW	4	4	4	4
												CYCLE LENGTH	100	90	100	90

IMPROVEMENT LOCATION - 6B

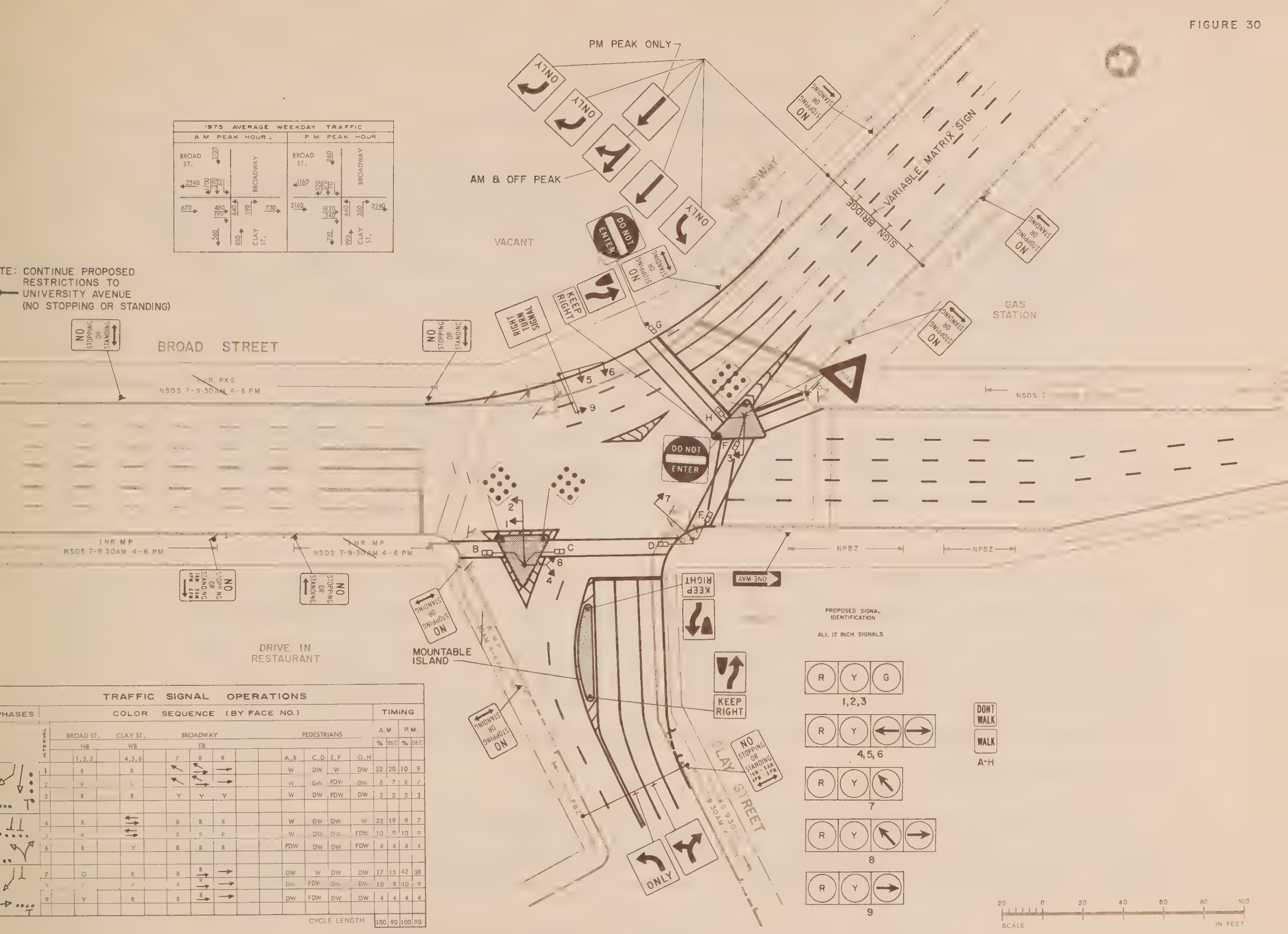
BROAD STREET AND WASHINGTON STREET

IMPROVEMENT LOCATION 6C

BROAD STREET AND CLAY STREET

Problems	Recommendations
• Heavy traffic volumes into Broad Street from Broadway and Clay Street cause congestion in the a.m. peak period. Northbound movement on Broad Street is congested in the p.m. peak period.	• Widen Clay Street to provide an adequate three-lane approach westbound and separate opposing flows. Provide a.m. peak and off-peak signal phasing suitable for different traffic conditions.
• Wide, confusing approaches on Clay Street and Broadway lead to accidents by vehicles turning from wrong lanes.	• Provide overhead lane use control signing for Broadway and Clay Street, including variable message sign for the center lane of Broadway which may be used for Broad Street and Clay Street traffic only, depending on the hour of day.
• A large unchannelized intersection area creates confusion and hazards to pedestrians.	• Use of channelization to better define traffic flow paths and improve pedestrian safety.

FIGURE 30



TRAFFIC SIGNAL OPERATIONS

INTERVAL	BROAD ST. NB 1,2,3	CLAY ST. WB 4,5,6	BROADWAY EB 7	BROADWAY EB 8	BROADWAY EB 9	PEDESTRIANS A,B	PEDESTRIANS C,D	PEDESTRIANS E,F	PEDESTRIANS G,H	TIMING A.M %	TIMING A.M SEC	TIMING P.M. %	TIMING P.M. SEC
1	R	R	↖	↖ →	→	W	DW	W	DW	22	20	10	9
2	R	R	↖	↖ →	→	W	DW	FDW	DW	8	7	8	7
3	R	R	Y	Y	Y	W	DW	FDW	DW	3	3	3	3
4	R	← →	R	R	R	W	DW	DW	W	22	19	9	7
5	R	← →	R	R	R	W	DW	DW	FDW	10	9	10	9
6	R	Y	R	R	R	FDW	DW	DW	FDW	4	4	4	4
7	G	R	R	R →	→	DW	W	DW	DW	17	15	42	38
8	G	R	R	R →	→	DW	FDW	DW	DW	10	9	10	9
9	Y	R	R	R →	→	DW	FDW	DW	DW	4	4	4	4
CYCLE LENGTH										100	90	100	90

IMPROVEMENT LOCATION - 6C

BROAD STREET AND CLAY STREET

IMPROVEMENT CORRIDOR 7

McCARTER HIGHWAY, SAYBROOK PLACE TO CLARK STREET

Existing Conditions

The McCarter Highway (State Route 21), a major north-south road in the City of Newark, serves as an important commuter access route for the central business district and also serves as a route for through traffic. Nine of the ten intersections located within this study corridor are signalized. Three of these (Rector Street, Fulton Street and Lombardy Place) do not meet the MUTCD signal warrant requirements and are recommended for removal.

McCarter Highway has a 1972 AWDT of 36,000 vehicles, with one-direction peak volumes reaching some 2,200 vehicles. This highway carries heavy traffic throughout the day, with excessive congestion and delay in both the morning and evening periods of peak flow. Significant truck traffic contributes to the daily volume. During the evening peak hours, the highway is so inundated with vehicles that it operates at a jammed condition (Level F). Due to this time and condition, fewer vehicles pass northbound than in off-peak hours.

The street width is 56 feet from Saybrook Place to Clay Street and 60 feet north of Clay Street. There exists generally two traffic lanes in each direction. Approximately one-half mile north of Clay Street the highway becomes a limited-access high-speed artery with three lanes in each direction. South of Saybrook Place the highway continues as a city street with generally two lanes in each direction. For TOPICS Study purposes the corridor analyzed was identified as that segment of the highway within Newark which had the severest need for improvement (taking account of both capacity and safety needs).

While the major improvements proposed for this corridor are detailed under the specific recommendations for Lombardy Street and Lombardy Place, Bridge Street, and Clay Street, several recommendations noted below apply to the corridor as a whole or to other locations in the corridor.

Problems	Recommendations
• Parking restrictions are not adequately posted along this corridor. Most signs are missing, and the few that are present are old and illegible.	• Post new "No Stopping or Standing" signs at appropriate intervals along both sides of the study corridor. A new resolution is needed to officially prohibit stopping or standing at all times on both sides of McCarter Highway between Hamilton Street and 250 feet north of Clark Street. This area should also be an actively enforced towaway zone during the peak hours of 7-9 a.m. and 4-6 p.m. (See section on Regulations and Enforcement.)
• Removal of the signal at Rector Street and McCarter Highway will necessitate adding a crosswalk at Saybrook and McCarter where no crosswalk is located now.	• Install a crosswalk on the south side of the intersection of Saybrook Place (northbound leg) to allow movement of pedestrians without interference to vehicular traffic.

IMPROVEMENT LOCATION 7A

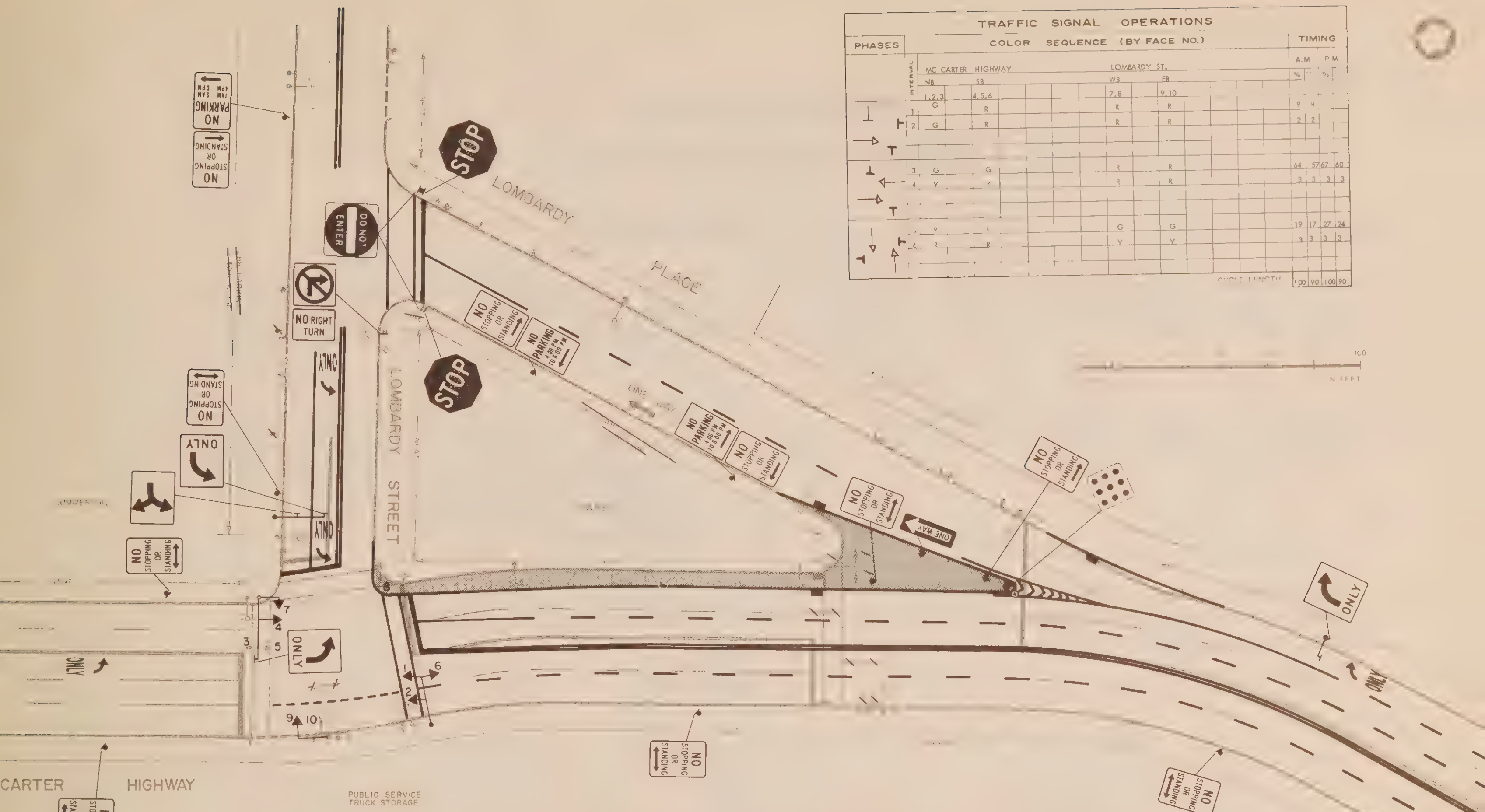
McCARTER HIGHWAY AND LOMBARDY STREET

Problem

- During the p.m. peak period the vehicles exiting from the Mutual Benefit parking garage overload the northbound storage for McCarter Highway at Bridge Street. In addition, the signal at Lombardy Place does not meet MUTCD warrants.

Recommendation

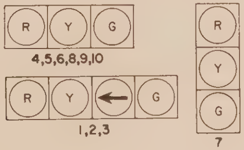
- Remove the signal at Lombardy Place and McCarter Highway. Channelize to force traffic from the parking garage to turn right on Lombardy Place. Vehicles from the parking garage destined for McCarter Highway may use Lombardy Street. Provide a double left from Lombardy Street to McCarter Highway to ease flow during the afternoon peak period.

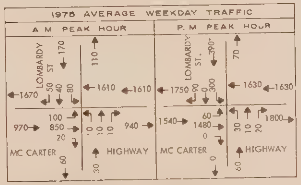


TRAFFIC SIGNAL OPERATIONS

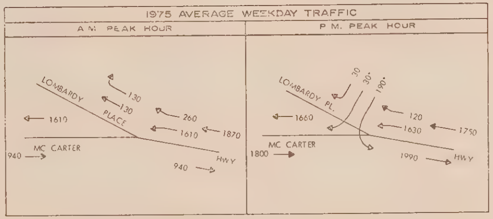
PHASES	INTERVAL	COLOR SEQUENCE (BY FACE NO.) MC CARTER HIGHWAY NB 1,2,3	SB 4,5,6	LOMBARDY ST. WB 7,8	EB 9,10	TIMING A.M %		P M %	
	1	G	R	R	R	9	8		
	2	G	R	R	R	2	2		
	3	G	G	R	R	64	57	67	60
	4	Y	Y	R	R	3	3	3	3
	5	R	R	G	G	19	17	27	24
	6	R	R	Y	Y	3	3	3	3
					CYCLE LENGTH	100	90	100	90

PROPOSED SIGNAL IDENTIFICATION
ALL 12 INCH SIGNALS





* INCLUDES TRAFFIC FROM PARKING GARAGE DIVERTED TO LOMBARDY STREET



*UNDER PROPOSED CONDITIONS ALL VEHICLES LEAVING PARKING GARAGE MUST TURN RIGHT ONTO LOMBARDY PLACE

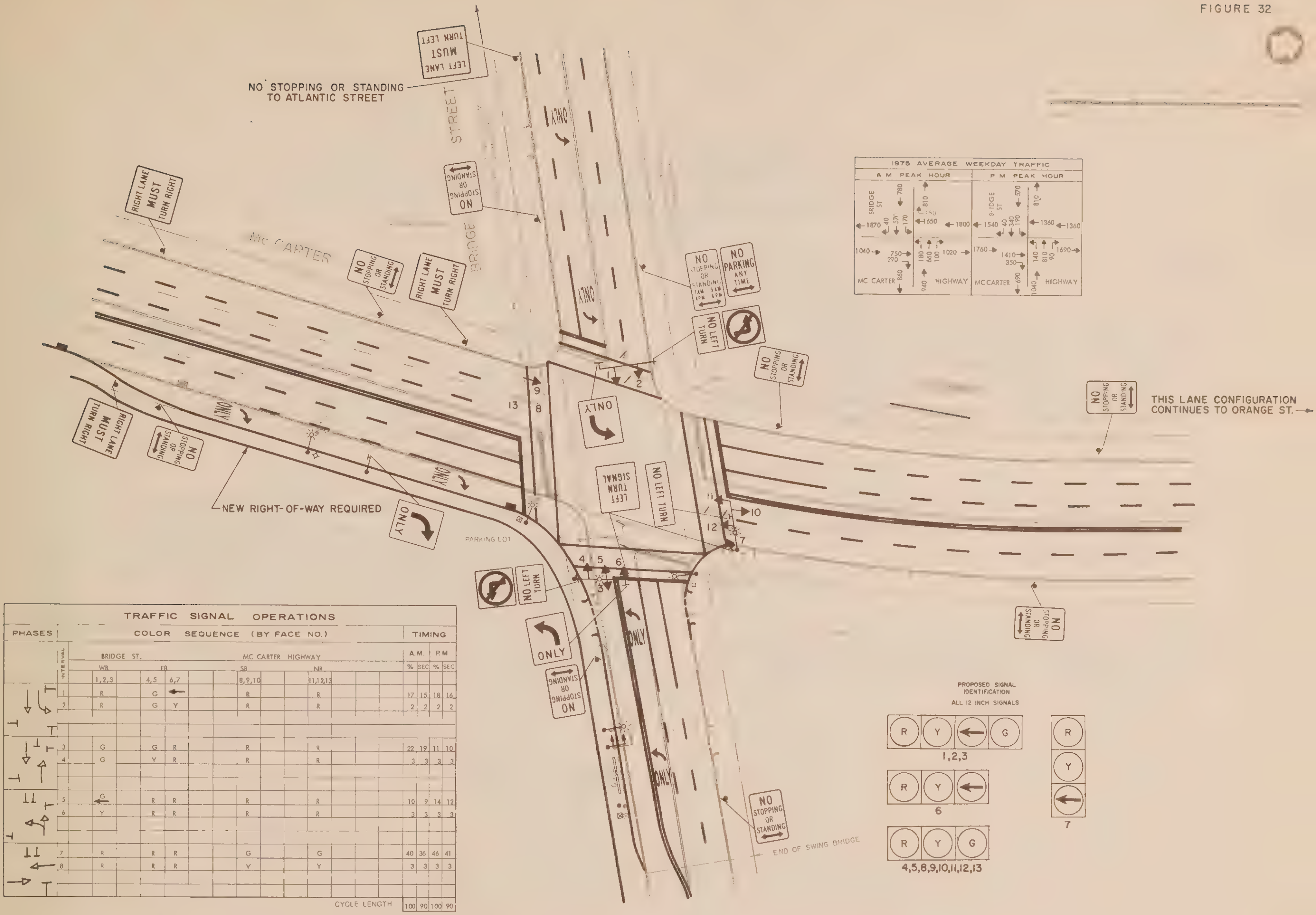
IMPROVEMENT LOCATION - 7A

McCARTER HIGHWAY AND LOMBARDY STREET

IMPROVEMENT LOCATION 7B

McCARTER HIGHWAY AND BRIDGE STREET

Problems	Recommendations
● High volumes of traffic require additional intersection capacity during both a.m. and p.m. peak periods.	● Provide three lanes southbound from Orange Street and widen the northbound side to provide a right-turn lane in addition to the two through lanes.
● Westbound volumes on Bridge Street exceed eastbound volumes especially in the p.m. peak.	● Provide two through lanes and one left-turn lane via an offset centerline on the westbound approach. Widen the south side of the approach to accommodate the eastbound through vehicles east of the intersection.
● Northbound vehicles turning right onto Bridge Street delay the passage of the northbound through vehicles.	● Add a right-turn lane as noted above to relieve the delay problem.



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	BRIDGE ST. WB 1,2,3	BRIDGE ST. EB 4,5	BRIDGE ST. EB 6,7	MC CARTER HIGHWAY SB 8,9,10	MC CARTER HIGHWAY NB 11,12,13	TIMING A.M. %	TIMING A.M. SEC	TIMING P.M %	TIMING P.M SEC
	1	R	G	←	R	R	17	15	18	16
	2	R	G	Y	R	R	2	2	2	2
	3	G	G	R	R	R	22	19	11	10
	4	G	Y	R	R	R	3	3	3	3
	5	G ←	R	R	R	R	10	9	14	12
	6	Y	R	R	R	R	3	3	3	3
	7	R	R	R	G	G	40	36	46	41
	8	R	R	R	Y	Y	3	3	3	3
						CYCLE LENGTH	100	90	100	90

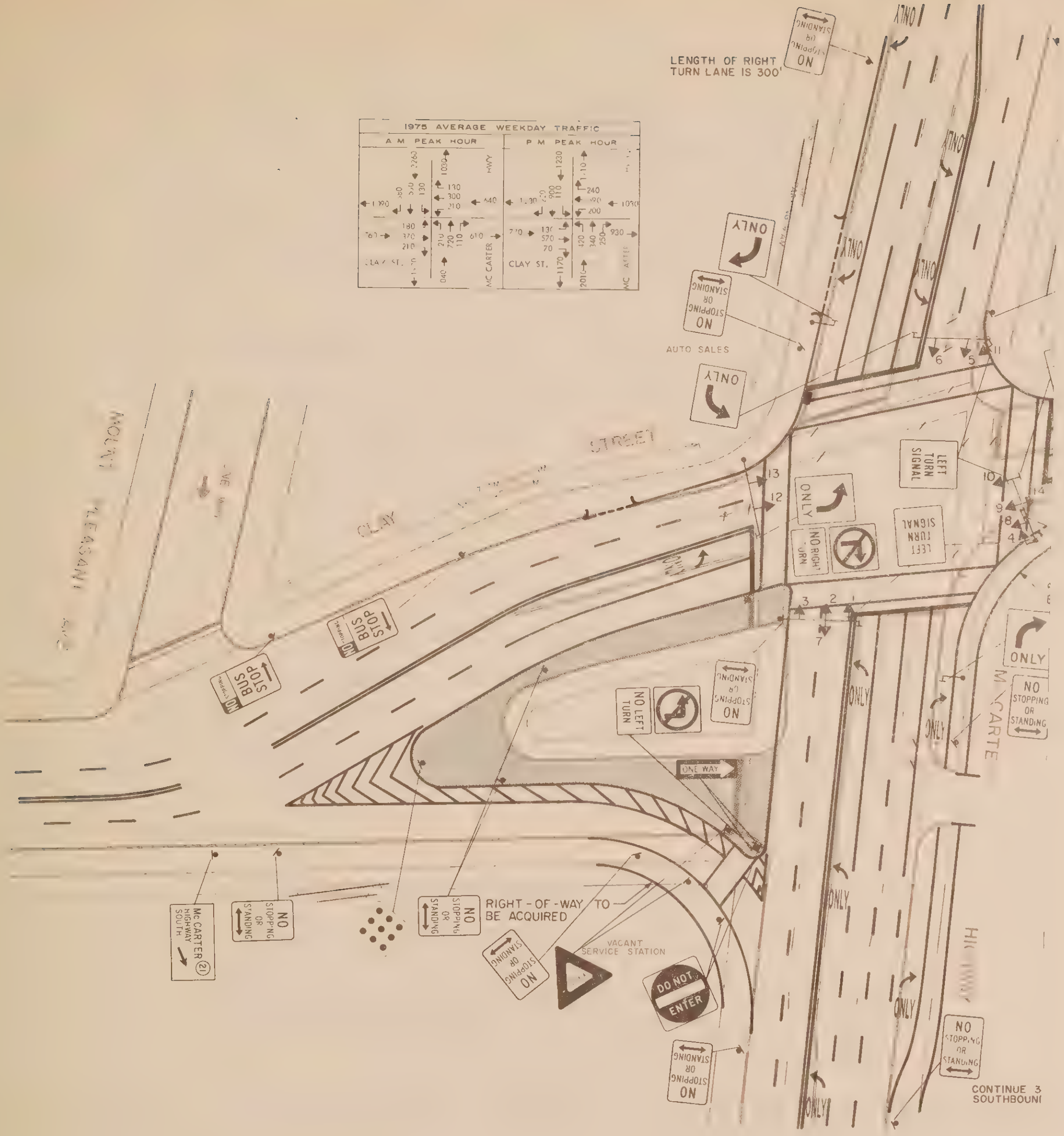
IMPROVEMENT LOCATION - 7B

McCARTER HIGHWAY AND BRIDGE STREET

IMPROVEMENT LOCATION 7C

McCARTER HIGHWAY AND CLAY STREET

Problems	Recommendations
• The significant directional variation in flow on McCarter Highway coupled with the high number of turning vehicles and the large volume of through vehicles creates a major capacity problem.	• Provide exclusive left-turn and right-turn lanes for each approach on McCarter Highway to separate the through movements, thus easing the capacity problem. This arrangement requires a small amount of widening and the taking of some property on the northbound approach.
• Heavy volumes and a large number of left turns on Clay Street also contribute to the capacity problem.	• Provide exclusive left-turn lanes on both Clay Street approaches and increase capacity on the westbound approach by offsetting the centerline to provide two through lanes. Some widening is required on the south side.
• The west approach of Clay Street has a confusing expanse of pavement which creates driver indecisiveness.	• Extend the existing island to supply more controlled channelization.



IMPROVEMENT

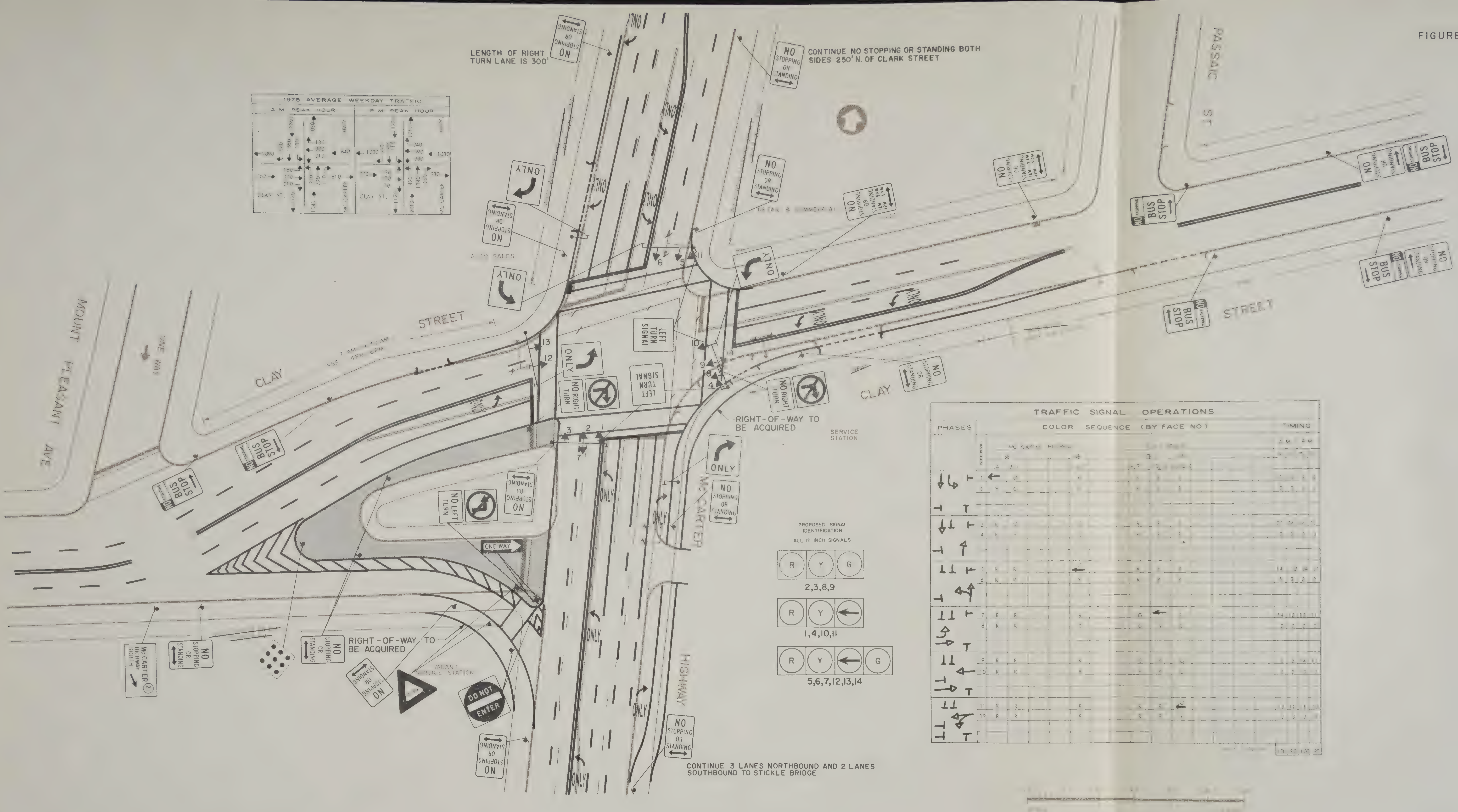
McCARTER HIGHWA'

IMPROVEMENT LOCATION 7C

McCARTER HIGHWAY AND CLAY STREET

Problems	Recommendations
• The significant directional variation in flow on McCarter Highway coupled with the high number of turning vehicles and the large volume of through vehicles creates a major capacity problem.	• Provide exclusive left-turn and right-turn lanes for each approach on McCarter Highway to separate the through movements, thus easing the capacity problem. This arrangement requires a small amount of widening and the taking of some property on the northbound approach.
• Heavy volumes and a large number of left turns on Clay Street also contribute to the capacity problem.	• Provide exclusive left-turn lanes on both Clay Street approaches and increase capacity on the westbound approach by offsetting the centerline to provide two through lanes. Some widening is required on the south side.
• The west approach of Clay Street has a confusing expanse of pavement which creates driver indecisiveness.	• Extend the existing island to supply more controlled channelization.

FIGURE 33



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	COLOR SEQUENCE (BY FACE NO)						TIMING A.M.		TIMING P.M.	
		MC CARTER HIGHWAY			CLAY STREET						
		1,4	2,3	[illegible]	[illegible]	[illegible]	[illegible]				
	1	←	G	R	R	R	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	Y	G	R	R	[illegible]	R	[illegible]	[illegible]	[illegible]	[illegible]
	3	R	G	[illegible]	R	R	[illegible]	[illegible]	24	[illegible]	[illegible]
	4	R	Y	[illegible]	R	R	[illegible]	3	3	3	3
	5	R	R	←	R	R	R	14	12	24	[illegible]
	6	R	R	Y	R	R	R	[illegible]	3	3	[illegible]
	7	R	R	R	G	←	R	14	12	12	11
	8	R	R	R	G	Y	R	2	2	2	2
	9	R	R	R	G	R	G	[illegible]	[illegible]	14	[illegible]
	10	R	R	R	Y	R	G	3	3	3	3
	11	R	R	R	R	R	←	13	11	11	13
	12	R	R	R	R	R	Y	3	3	3	3
								100	90	100	90

IMPROVEMENT LOCATION - 7C

McCARTER HIGHWAY AND CLAY STREET

BLOOMFIELD AVENUE FROM BROADWAY TO THE NEWARK-BLOOMFIELD LINE

Bloomfield Avenue was analyzed as part of the Essex County TOPICS Study. The recommended program of improvements is summarized here.

Existing Conditions

Excessive congestion and high accident potential exist along this major radial arterial from Newark to the northwest suburbs. Traffic volumes of 26,000 AWDT and 1,100 one direction in the peak hour use this street,* which has two 30-foot roadways separated by a median island. Land use is characterized by concentrated retail commercial development and high density residential use.

In particular, the existing signal timing and progression flexibility are not adequate to meet changes in traffic flow during the day. These existing signals do not conform in many instances with standards specified in the Manual on Uniform Traffic Control Devices. Also, the existing center median leaves no room for left-turn lanes to local streets, resulting in delay and queuing along Bloomfield Avenue behind left-turning vehicles.

Recommendations

The following improvements are recommended:

- Removal of the center islands and provision of left-turn lanes for access to local streets.
- Modernization of existing signals as required by the island removal and for compliance of signals with the Manual on Uniform Traffic Control Devices.

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*Volumes were measured after the opening of I-280 from I-80 through Newark to Harrison.

- Coordination of signals along Bloomfield Avenue from Ward Street (Bloomfield) to Broadway by a fully traffic-responsive General Purpose Digital Computer that will provide a minimum of three timing patterns to afford flexibility to meet changes in traffic flow. The eastern portion of Park Avenue from Parker Street to Bloomfield Avenue will be included in the coordination system.

- Installation of pedestrian signals to provide safe, sufficient clearance for pedestrian crossings of Bloomfield Avenue.

- Provision of additional drainage facilities in the center of Bloomfield Avenue to receive runoff during inclement weather.

SPOT IMPROVEMENT PROJECTS

Other locations within Newark were also found to be particularly critical in terms of accidents, capacity, or overall traffic flow. These "spot" locations (numbers 8-20) were not included in the previously mentioned corridors. Each location was analyzed to determine existing problems and inadequacies and to arrive at recommendations to mitigate hazardous or congested conditions. Functional plans for each of these locations follow below along with discussions of problems and recommendations for their solution.

IMPROVEMENT LOCATION 8

ELIZABETH AVENUE AND MEEKER AVENUE

Problems	Recommendations
• The insufficient width of the existing roadways within the intersection and its approaches causes delays and congestion.	• Widen the south approach of Elizabeth Avenue and the southern side of Meeker Avenue east of the intersection.
• Heavy left-turning traffic from the east approach of Meeker Avenue conflicts with through traffic from the west approach of Meeker Avenue.	• Convert Meeker Avenue to one-way traffic westbound from Elizabeth Avenue to Hillside Avenue and Custer Place. Since Meeker Avenue is not a through street west of Elizabeth Avenue the diverted eastbound flow should easily find other streets convenient for access to destinations.
• Lack of proper pavement markings and lane designations causes driver confusion and delays.	• Designate separate left-turning lanes on the east approach of Meeker Avenue and the north approach of Elizabeth Avenue. Install overhead turning lane signs to emphasize lane use.
• The existing signal layout and operation does not permit maximum utilization of the intersection.	• Revise traffic signal layout and operation.
• The lack of channelization results in increased accident potential.	• Construct islands to properly separate conflicting traffic movements.

The City of Newark will complete a plan for this improvement project prior to the time of implementation.

IMPROVEMENT LOCATION 9

SPRINGFIELD AVENUE AND TENTH STREET

Problems	Recommendations
• The length of the existing intersection is nearly 360 feet from stop line to stop line along Springfield Avenue. The existing arrangement requires eastbound motorists to stop at a poorly designated location.	• Remove the pedestrian crosswalk and the traffic signals at the easterly end of the intersection. Create a new crosswalk west of the east approach of Eighteenth Avenue, controlled by a pushbutton-activated WALK-DONT WALK signal. This configuration will require children to cross only one major artery on their way to school from the north side of Springfield Avenue. Install temporary pedestrian barricades to discourage the use of the former crosswalk.
• The wide throat of the eastbound Springfield Avenue intersection with Eighteenth Avenue creates vehicular and pedestrian conflicts and driver confusion.	• Construct an island to separate the right- and left-turning movements into Eighteenth Avenue eastbound.
• The wide pavement area at the northeast corner of the Springfield Avenue - South Tenth Street intersection prevents proper traffic control.	• Construct an island and install a traffic signal on the island.
• The lack of appropriate signal heads and the improperly located crosswalks creates hazards for pedestrians.	• Install additional signal heads and relocate crosswalks to increase pedestrian safety.
• Lack of parking restrictions during off-peak hours within the intersection decreases safety and capacity. Frequent occurrence of double parking causes additional hazards and delay.	• Prohibit stopping and standing at all times through the intersection area to increase capacity and safety. Enforce posted parking restrictions.

The City of Newark will complete a plan for this improvement project prior to the time of implementation.

IMPROVEMENT LOCATION 10

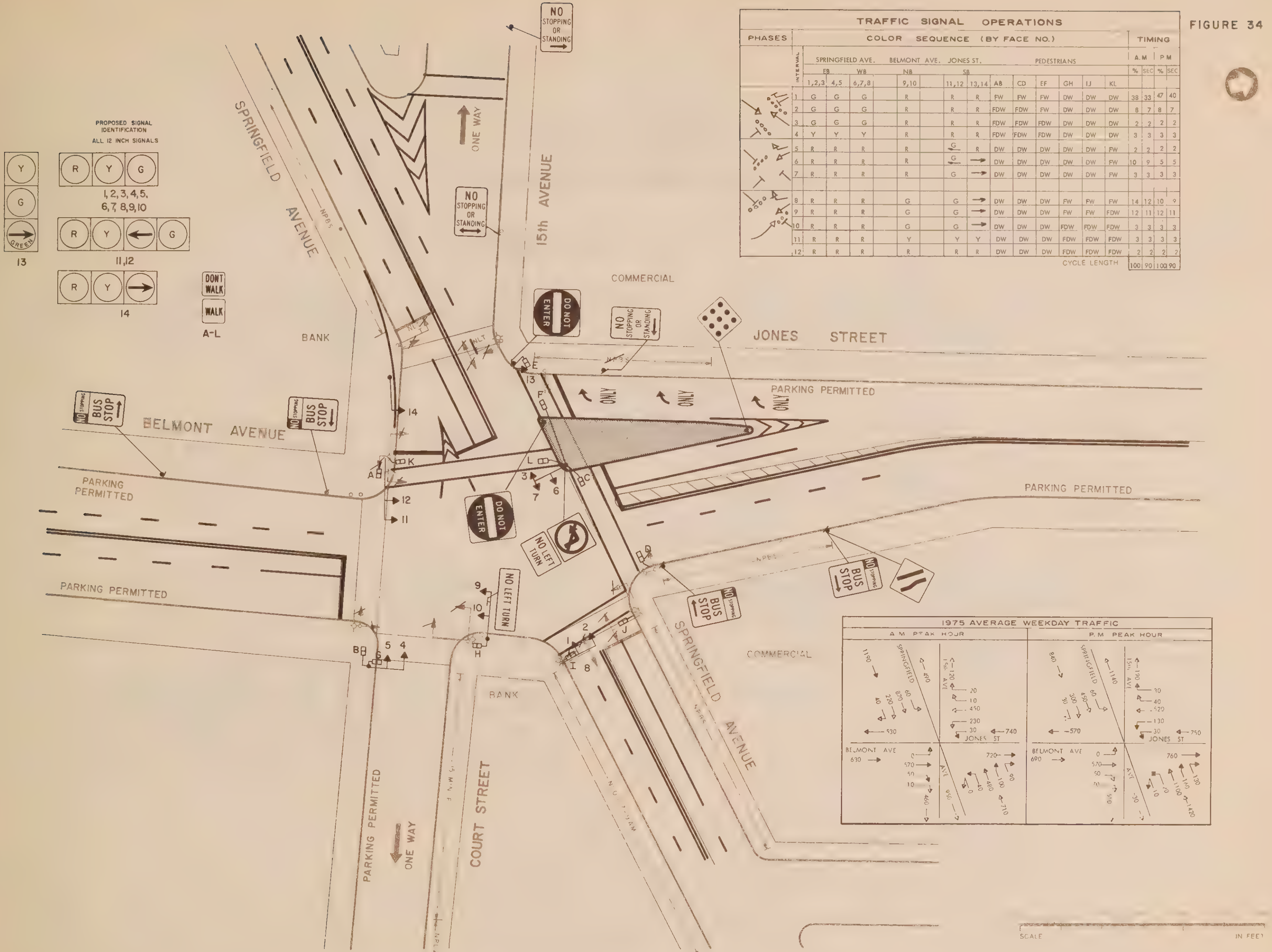
SPRINGFIELD AVENUE AND BELMONT AVENUE

Problems	Recommendations
• A high frequency of rear-end and right-angle collisions were reported from 1966 to 1968.	• Install backplates on the signal controlling Springfield Avenue traffic to offer contrast of the signal and the sky. Include red clearance intervals after each green phase and reduce the area of conflict within the intersection to further reduce the frequency of right-angle collisions. In addition, 12" signal lenses are recommended for all approaches.
• High frequency of pedestrian accidents exists.	• Install WALK, DONT WALK signals to afford pedestrians clear indications as to safe crossing times.
• A large pavement area on the Jones Street approach causes driver confusion and induces vehicles to queue three abreast while only two possible exit lanes are provided on Belmont Avenue.	• Install concrete channelization on the Jones Street approach to reduce the excessively large pavement area while channelizing movements and reducing the length of the crosswalk traversing Jones Street.
• Intersection operation constitutes a capacity bottleneck on Springfield Avenue in peak hours.	• Redistribute cycle time, in conjunction with a shortened advance phase for Jones Street, during the p.m. peak traffic period to efficiently reflect demand by allowing more green time to Springfield Avenue.

FIGURE 34

TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	SPRINGFIELD AVE. EB 1,2,3	SPRINGFIELD AVE. EB 4,5	SPRINGFIELD AVE. WB 6,7,8		BELMONT AVE. NB 9,10		JONES ST. SB 11,12	JONES ST. SB 13,14	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	PEDESTRIANS IJ	PEDESTRIANS KL	TIMING A.M %	TIMING A.M SEC	TIMING P M %	TIMING P M SEC
	1	G	G	G		R		R	R	FW	FW	FW	DW	DW	DW	38	33	47	40
	2	G	G	G		R		R	R	FDW	FDW	FW	DW	DW	DW	8	7	8	7
	3	G	G	G		R		R	R	FDW	FDW	FDW	DW	DW	DW	2	2	2	2
	4	Y	Y	Y		R		R	R	FDW	FDW	FDW	DW	DW	DW	3	3	3	3
	5	R	R	R		R		G ←	R	DW	DW	DW	DW	DW	FW	2	2	2	2
	6	R	R	R		R		G ←	→	DW	DW	DW	DW	DW	FW	10	9	5	5
	7	R	R	R		R		G	→	DW	DW	DW	DW	DW	FW	3	3	3	3
	8	R	R	R		G		G	→	DW	DW	DW	FW	FW	FW	14	12	10	9
	9	R	R	R		G		G	→	DW	DW	DW	FW	FW	FDW	12	11	12	11
	10	R	R	R		G		G	→	DW	DW	DW	FDW	FDW	FDW	3	3	3	3
	11	R	R	R		Y		Y	Y	DW	DW	DW	FDW	FDW	FDW	3	3	3	3
	12	R	R	R		R		R	R	DW	DW	DW	FDW	FDW	FDW	2	2	2	2
															CYCLE LENGTH	100	90	100	90



IMPROVEMENT LOCATION - 10

SPRINGFIELD AVENUE AND BELMONT AVENUE

IMPROVEMENT LOCATION 11

SOUTH ORANGE AVENUE AND JONES STREET

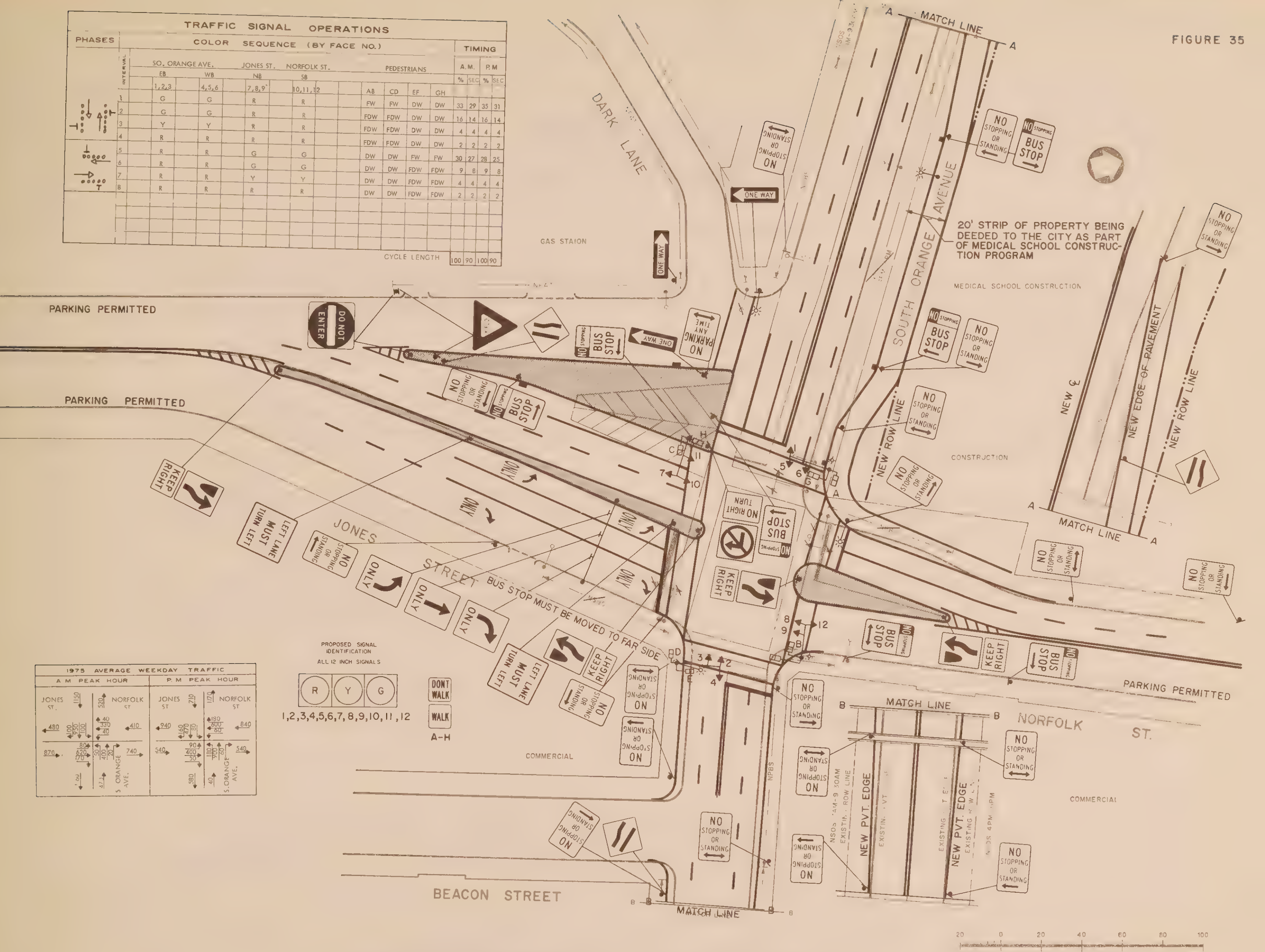
Problems

- A high frequency of right-angle collisions was reported from 1966 through 1968 with many involving personal injury and occurring during the signal flashing operation.
- Lack of channelization has created a large area for vehicular conflict. Also, long crosswalks, and an absence of pedestrian signals cause confusion to both pedestrians and driver.
- Heavy traffic flows on South Orange Avenue and significant traffic flows on Norfolk and Jones Streets exist, which when combined with near side bus stops, cause capacity and turning movement problems.

Recommendations

- Introduce an all-red clearance interval after each phase to decrease the incidence of right-angle collisions. Flashing operation during late hours should be eliminated to reduce accidents.
- Install pedestrian signals and construct traffic islands on the Norfolk Street and Jones Street approaches to improve pedestrian safety, channelize the traffic and reduce the conflict area.
- Widen the South Orange Avenue approaches to the intersection to permit two traffic lanes of adequate width in each direction. Move the near side bus stops to the far side of the intersection on three approaches. Create an exclusive bus lane on the northwest side of South Orange Avenue for loading-unloading operations. This last proposal makes use of an additional 20 feet of right-of-way being provided for South Orange Avenue from the Medical School property.

FIGURE 35



TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	SO. ORANGE AVE. EB 1,2,3	SO. ORANGE AVE. WB 4,5,6	JONES ST. NB 7,8,9	NORFOLK ST. SB 10,11,12	PEDESTRIANS AB	PEDESTRIANS CD	PEDESTRIANS EF	PEDESTRIANS GH	TIMING A.M. %	TIMING A.M. SEC	TIMING P.M %	TIMING P.M SEC
	1	G	G	R	R	FW	FW	DW	DW	33	29	35	31
	2	G	G	R	R	FDW	FDW	DW	DW	16	14	16	14
	3	Y	Y	R	R	FDW	FDW	DW	DW	4	4	4	4
	4	R	R	R	R	FDW	FDW	DW	DW	2	2	2	2
	5	R	R	G	G	DW	DW	FW	FW	30	27	28	25
	6	R	R	G	G	DW	DW	FDW	FDW	9	8	9	8
	7	R	R	Y	Y	DW	DW	FDW	FDW	4	4	4	4
	8	R	R	R	R	DW	DW	FDW	FDW	2	2	2	2
									CYCLE LENGTH	100	90	100	90

IMPROVEMENT LOCATION -11

SOUTH ORANGE AVENUE AND JONES STREET

IMPROVEMENT LOCATION 12

WEST MARKET STREET AND BERGEN STREET

Problems	Recommendations
• The geometry of the existing intersection results in very poor alignment, both for through traffic and turning traffic.	• West Market Street is to be widened on the westerly side. North of the intersection, in accordance with the City's plans for widening West Market Street, construct islands as shown on the accompanying plans to properly align and channelize traffic movements.
• The lack of proper pavement markings and traffic control leads to driver confusion and accidents.	• Paint lane lines and clearly designate the use of lanes as shown. Install overhead turning lane signs to emphasize proper lane use.
• The sharp curb return on the northeast corner of First Street and West Market Street makes turning movement difficult.	• Reconstruct curb return to increase turning radius and to properly align First Street traffic toward Bergen Street.
• Existing traffic signal control and the location of crosswalks make crossing of pedestrians to the College of Medicine and Dentistry hazardous.	• Relocate crosswalks and install pedestrian signals.
• The current practice of angle parking on Bergen Street is hazardous.	• Eliminate angle parking and permit parallel parking only where it does not interfere with traffic operations.

The City of Newark will complete a plan for this improvement project prior to the time of implementation.

IMPROVEMENT LOCATION 13

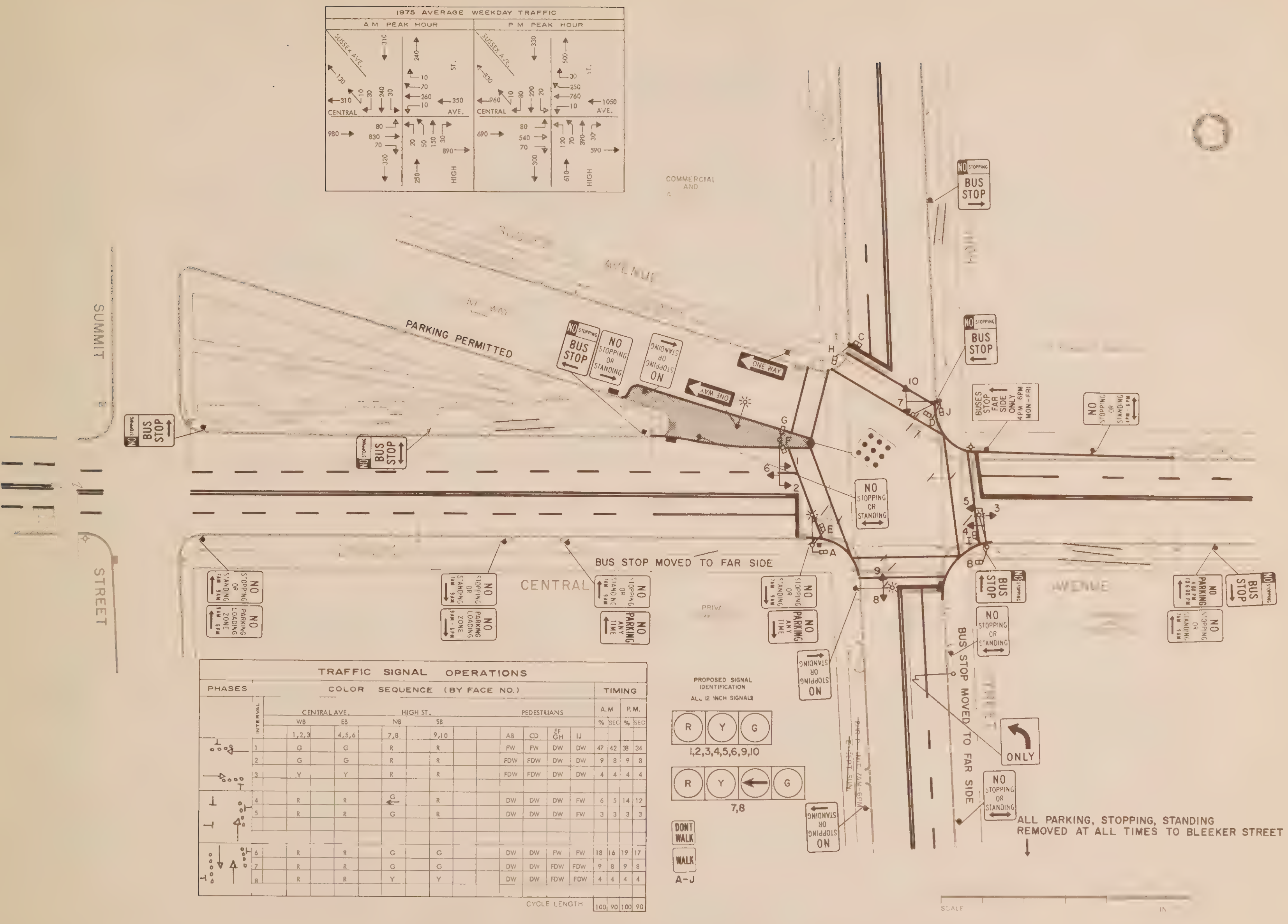
CENTRAL AVENUE AND HIGH STREET

Problems

- Excessive rear-end, left-turn, and right-angle collisions involving personal injury were reported from 1966 through 1968, including many pedestrian accidents.
- A heavy p.m. peak left-turn movement from the High Street northbound approach creates congestion and long queues which block intersecting cross streets south of Central Avenue.
- A severe overall capacity problem exists at this intersection in the p.m. peak hour.

Recommendations

- Improve signal visibility by use of 12" lenses and better positioning of heads. Provide pedestrian signals and repaint pavement markings and improve crosswalks.
- Prohibit parking for one block on the southeast side of High Street and create an exclusive left-turn lane on the northbound approach to alleviate queuing and blockage. Provide a left-turn arrow for the advance phase, which should be adjusted to traffic volumes.
- Adjust the signal phasing to provide the optimum allocation of green time for the various approaches. Provide an exclusive bus loading bay for westbound Central Avenue buses using the triangular park west of the intersection. Require westbound buses to use only the far side stop during the p.m. peak. Cut back curbs to permit smoother right turns.



TRAFFIC SIGNAL OPERATIONS												
PHASES	INTERVAL	COLOR SEQUENCE (BY FACE NO.)								TIMING			
		CENTRAL AVE.		HIGH ST.		PEDESTRIANS				A.M		P.M.	
		WB	EB	NB	SB					%	SEC	%	SEC
		1,2,3	4,5,6	7,8	9,10	AB	CD	EF GH	IJ				
	1	G	G	R	R	FW	FW	DW	DW	47	42	38	34
	2	G	G	R	R	FDW	FDW	DW	DW	9	8	9	8
	3	Y	Y	R	R	FDW	FDW	DW	DW	4	4	4	4
	4	R	R	G ←	R	DW	DW	DW	FW	6	5	14	12
	5	R	R	G	R	DW	DW	DW	FW	3	3	3	3
	6	R	R	G	G	DW	DW	FW	FW	18	16	19	17
	7	R	R	G	G	DW	DW	FDW	FDW	9	8	9	8
	8	R	R	Y	Y	DW	DW	FDW	FDW	4	4	4	4
									CYCLE LENGTH	100	90	100	90

IMPROVEMENT LOCATION - 13

CENTRAL AVENUE AND HIGH STREET

IMPROVEMENT LOCATION 14

PARK AVENUE AT BRANCH BROOK PARK

This intersection has been analyzed and a design proposed for its improvement by the Essex County Highway Department. The recommended program of improvements is summarized here.

Existing Conditions

Park Avenue, a major arterial connecting Newark to its northwestern suburbs, carries approximately 900 vehicles per hour in one direction during peak periods. At the present time, a heavy exchange of traffic occurs between Park Avenue and the Branch Brook Park Road, which traverses the length of the park. An underpass below Park Avenue carries through traffic on the park road; however, heavy left-turning movements to park road connectors (to and from Park Avenue) still promote congestion and high accident potential.

Recommendations

The following improvements are recommended:

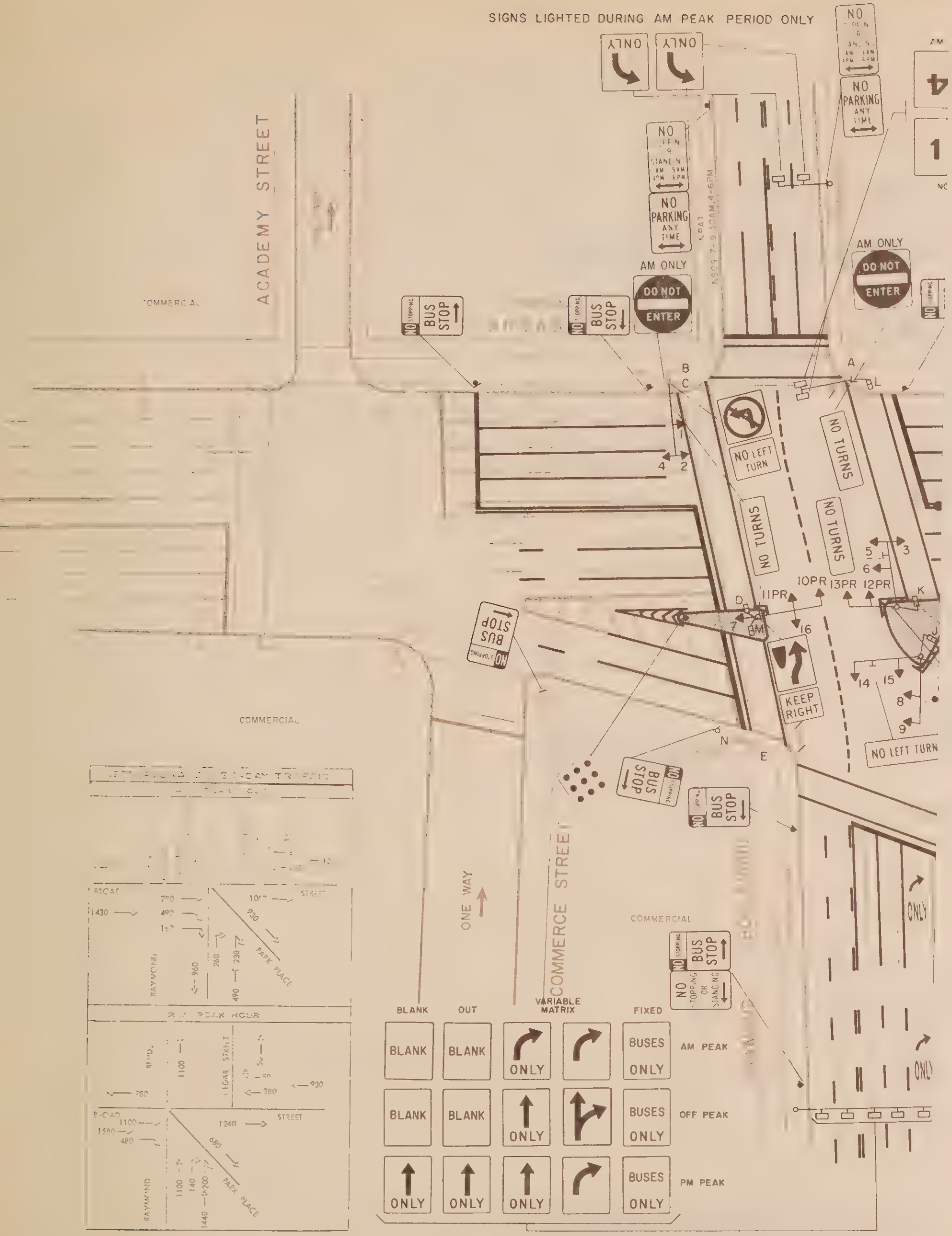
- Revision of the connecting ramps to prohibit left turns by traffic interchanging between Park Avenue and the park road.

- Continue all turning movements by requiring traffic formerly turning left to turn right and utilize the underpass. This improvement is included under the Newark TOPICS program.

IMPROVEMENT LOCATION 15

RAYMOND BOULEVARD AND BROAD STREET

Problems	Recommendations
• Heavy right-turn movements from the east to Broad Street and Park Place during peak hours cause serious congestion.	• Provide an exclusive right-turn lane on the east approach and install variable matrix overhead lane use control signs to facilitate turning movement flow and reduce congestion.
• The short section of Broad Street between Raymond Boulevard and Cedar Street provides inadequate storage, resulting in congestion and occasional blockage of the major intersection. Left turns and jog movements from the east approach of Raymond Boulevard to Cedar Street further add to the congestion of this section of Broad Street.	• Remove the left turn to Cedar Street; this lane space is given to the southbound approach to increase capacity in that direction. High pedestrian volumes require retention of the Cedar Street crosswalk, but the stop line is moved forward to secure maximum storage area. Provision for left-turn advance at West Park Street will accommodate displaced Cedar Street left turns.
• Existing traffic signal phasing and appurtenances are incompatible with the reversible one-way operation on Raymond Boulevard, resulting in excessive clearance intervals and dangerously conflicting vehicle and pedestrian movements.	• Install new signal indications, appropriate signing and markings and revised signal phasing to allocate right-of-way to each approach in an optimum manner while minimizing conflicts between both vehicular and vehicle-pedestrian movements.
• Roadside friction and the large undefined intersection area cause confusion and constitute a safety hazard to motorists and pedestrians.	• Channelize the intersection by constructing islands to clearly define the pavement areas to be utilized for each movement. Provide a new pedestrian crosswalk on the north side of Raymond Boulevard.
• One-way eastbound operation on Raymond Boulevard west of the intersection during the a.m. peak occurs in four lanes. Two-way operation on the east approach, however, results in a potential head-on conflict between eastbound vehicles in the two left lanes and vehicles traveling west on the east approach.	• Provide two exclusive left-turn lanes on the west approach with overhead lane-use control signs (illuminated only during the a.m. peak period). In conjunction with a special a.m. peak left-turn signal and special phasing this configuration will reduce the potential head-on conflict.

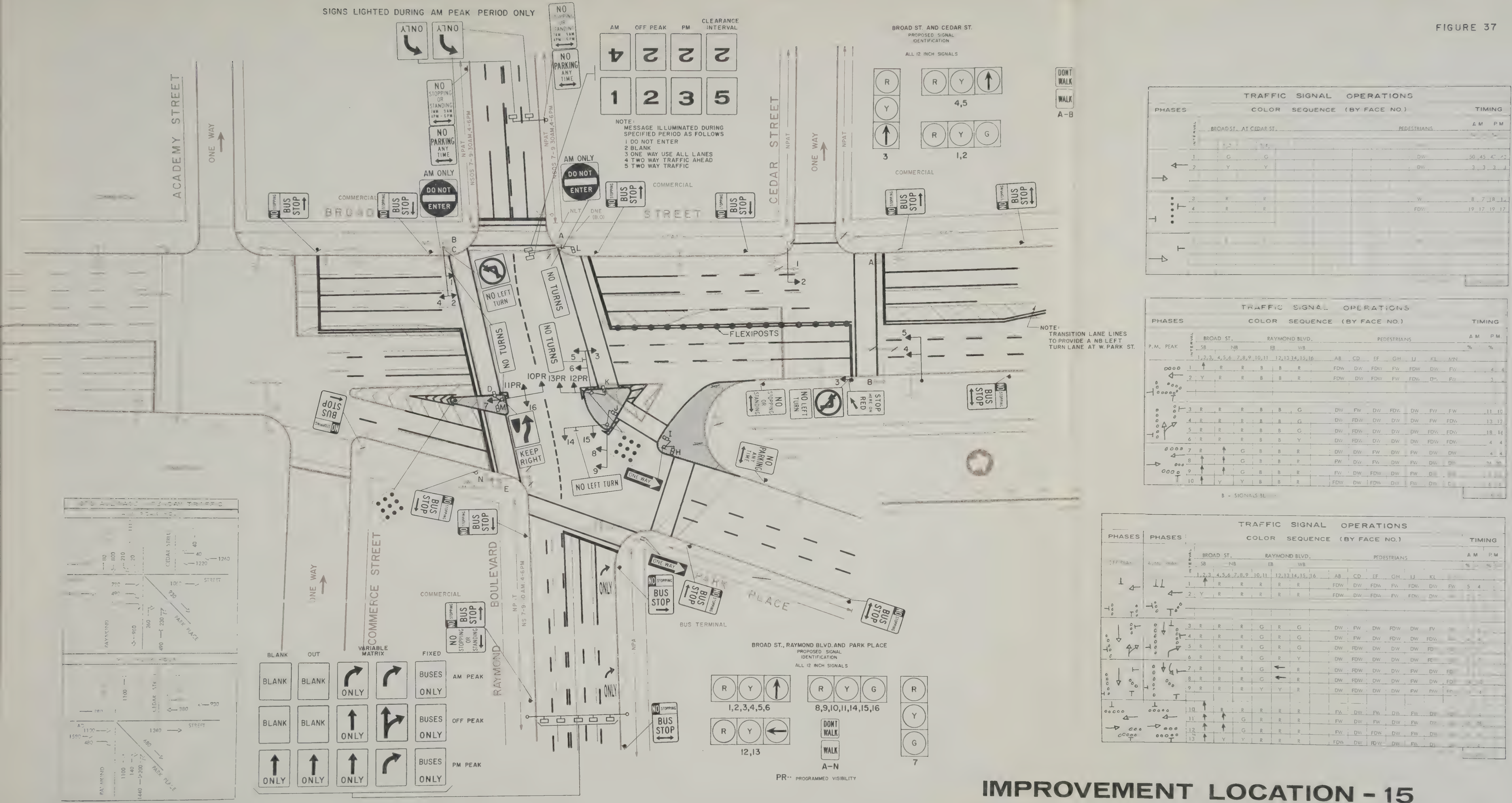

SIGNS LIGHTED DURING AM PEAK PERIOD ONLY
ONLY
NO PARKING ANY TIME
AM ONLY
DO NOT ENTER
ACADEMY STREET
COMMERCIAL
BUS STOP
NO STOPPING
B
C
A
BL
NO LEFT TURN
NO TURNS
KEEP RIGHT
11PR
10PR
13PR
12PR
D
M
K
E
N
NO LEFT TURN
ONE WAY
COMMERCE STREET
COMMERCIAL
NO STOPPING OR STANDING
RAYMOND
PARK PLACE
STREET
PM PEAK HOUR
BLANK
OUT
VARIABLE MATRIX
FIXED
BLANK
BUSES ONLY
AM PEAK
OFF PEAK
PM PEAK

IMPROVEMENT LOCATION 15

RAYMOND BOULEVARD AND BROAD STREET

Problems	Recommendations
• Heavy right-turn movements from the east to Broad Street and Park Place during peak hours cause serious congestion.	• Provide an exclusive right-turn lane on the east approach and install variable matrix overhead lane use control signs to facilitate turning movement flow and reduce congestion.
• The short section of Broad Street between Raymond Boulevard and Cedar Street provides inadequate storage, resulting in congestion and occasional blockage of the major intersection. Left turns and jog movements from the east approach of Raymond Boulevard to Cedar Street further add to the congestion of this section of Broad Street.	• Remove the left turn to Cedar Street; this lane space is given to the southbound approach to increase capacity in that direction. High pedestrian volumes require retention of the Cedar Street crosswalk, but the stop line is moved forward to secure maximum storage area. Provision for left-turn advance at West Park Street will accommodate displaced Cedar Street left turns.
• Existing traffic signal phasing and appurtenances are incompatible with the reversible one-way operation on Raymond Boulevard, resulting in excessive clearance intervals and dangerously conflicting vehicle and pedestrian movements.	• Install new signal indications, appropriate signing and markings and revised signal phasing to allocate right-of-way to each approach in an optimum manner while minimizing conflicts between both vehicular and vehicle-pedestrian movements.
• Roadside friction and the large undefined intersection area cause confusion and constitute a safety hazard to motorists and pedestrians.	• Channelize the intersection by constructing islands to clearly define the pavement areas to be utilized for each movement. Provide a new pedestrian crosswalk on the north side of Raymond Boulevard.
• One-way eastbound operation on Raymond Boulevard west of the intersection during the a.m. peak occurs in four lanes. Two-way operation on the east approach, however, results in a potential head-on conflict between eastbound vehicles in the two left lanes and vehicles traveling west on the east approach.	• Provide two exclusive left-turn lanes on the west approach with overhead lane-use control signs (illuminated only during the a.m. peak period). In conjunction with a special a.m. peak left-turn signal and special phasing this configuration will reduce the potential head-on conflict.

FIGURE 37



IMPROVEMENT LOCATION - 15

RAYMOND BOULEVARD AND BROAD STREET

IMPROVEMENT LOCATION 16

RAYMOND BOULEVARD AND PINE STREET

Problems

- With Raymond Boulevard operating as a one-way street from Mulberry Street westward during the p.m. peak period, vehicles entering this intersection from Pine Street and from the parking lot and parking garage are forced to go west, even though their destination may be to the east.

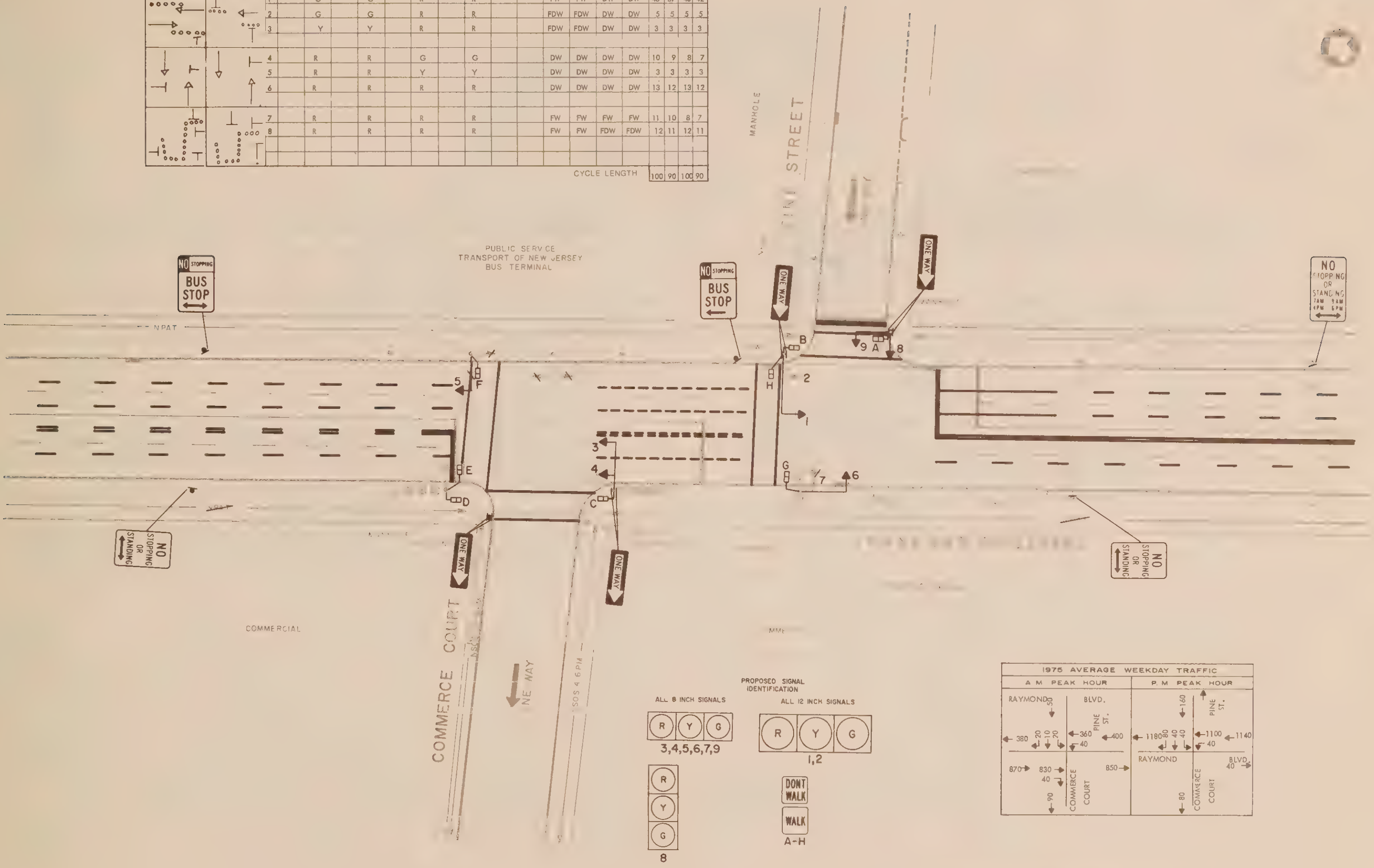
Recommendations

- Institute two-way traffic on Raymond Boulevard from Mulberry Street to Pine Street throughout the day. The changeover to one-way should begin at Pine Street.

FIGURE 38

TRAFFIC SIGNAL OPERATIONS

PHASES	PHASES	COLOR SEQUENCE (BY FACE NO.)								TIMING			
OFF PEAK A.M. PEAK	P.M. PEAK	INTERVAL	RAYMOND BLVD.		PINE ST.		PEDESTRIANS				A M.		P.M	
			WB	EB	SB	NB					%	SEC	%	SEC
			1,2	3,4,5	6,7	8,9	AB	CD	EF	GH				
		1	G	G	R	R	FW	FW	DW	DW	43	37	48	42
		2	G	G	R	R	FDW	FDW	DW	DW	5	5	5	5
		3	Y	Y	R	R	FDW	FDW	DW	DW	3	3	3	3
		4	R	R	G	G	DW	DW	DW	DW	10	9	8	7
		5	R	R	Y	Y	DW	DW	DW	DW	3	3	3	3
		6	R	R	R	R	DW	DW	DW	DW	13	12	13	12
		7	R	R	R	R	FW	FW	FW	FW	11	10	8	7
		8	R	R	R	R	FW	FW	FDW	FDW	12	11	12	11
										CYCLE LENGTH	100	90	100	90



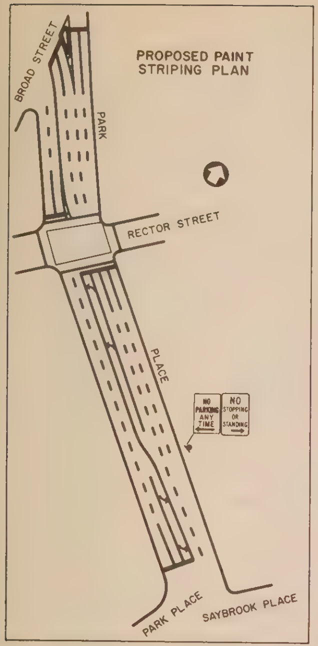
IMPROVEMENT LOCATION - 16

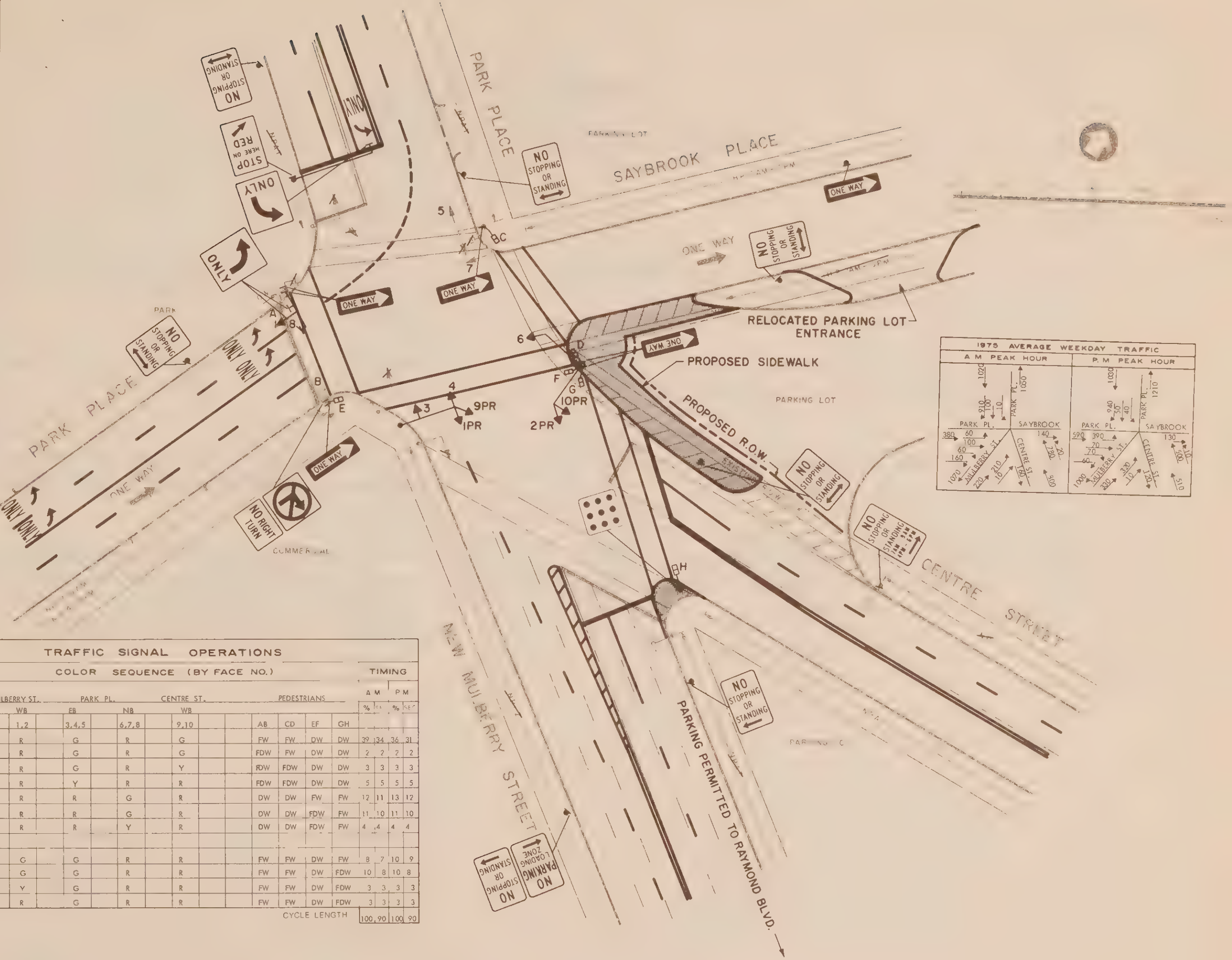
RAYMOND BOULEVARD AND PINE STREET

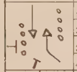
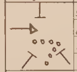
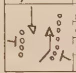
IMPROVEMENT LOCATION 17

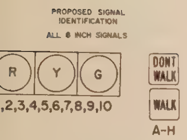
MULBERRY STREET AND PARK PLACE

Problems	Recommendations
• Inefficient signal operation causes delays and traffic hazards at this intersection.	• Rearrange signal configuration and readjust signal timing to reduce traffic hazards and delays. Remove all-red pedestian walk phase.
• Signal clearance time is insufficient for the through movements from both Mulberry Street and Centre Street approaches.	• Use double clearance intervals for both Mulberry Street and Centre Street approaches to provide sufficient clearance and increase safety.
• A very heavy volume of pedestrians and the absence of pedestrian signals and crosswalks on the Centre Street approach makes the pedestrian movements difficult and hazardous.	• Install pedestrian signals and crosswalks and construct concrete sidewalk at the Centre Street approach to facilitate pedestrian crossings. Relocate entrances and exits to the parking lot between Centre Street and Saybrook Place to more safely organize traffic flow and permit a better pedestrian refuge island.





TRAFFIC SIGNAL OPERATIONS												
PHASES	COLOR SEQUENCE (BY FACE NO.)								TIMING			
		MULBERRY ST.	PARK PL.	CENTRE ST.		PEDESTRIANS			A M		P M	
		WB	EB	NB	WB				%	SEC	%	SEC
	INTERVAL	1,2	3,4,5	6,7,8	9,10	AB	CD	EF	GH				
	1	R	G	R	G	FW	FW	DW	DW	39	34	36	31
	2	R	G	R	G	FDW	FW	DW	DW	2	2	2	2
	3	R	G	R	Y	FDW	FDW	DW	DW	3	3	3	3
	4	R	Y	R	R	FDW	FDW	DW	DW	5	5	5	5
	5	R	R	G	R	DW	DW	FW	FW	12	11	13	12
	6	R	R	G	R	DW	DW	FDW	FW	11	10	11	10
	7	R	R	Y	R	DW	DW	FDW	FW	4	4	4	4
	8	G	G	R	R	FW	FW	DW	FW	8	7	10	9
	9	G	G	R	R	FW	FW	DW	FDW	10	8	10	8
	10	Y	G	R	R	FW	FW	DW	FDW	3	3	3	3
	11	R	G	R	R	FW	FW	DW	FDW	3	3	3	3
									CYCLE LENGTH	100	90	100	90



PR--PROGRAMMED VISIBILITY

IMPROVEMENT LOCATION -17

MULBERRY STREET AND PARK PLACE

IMPROVEMENT LOCATION 18

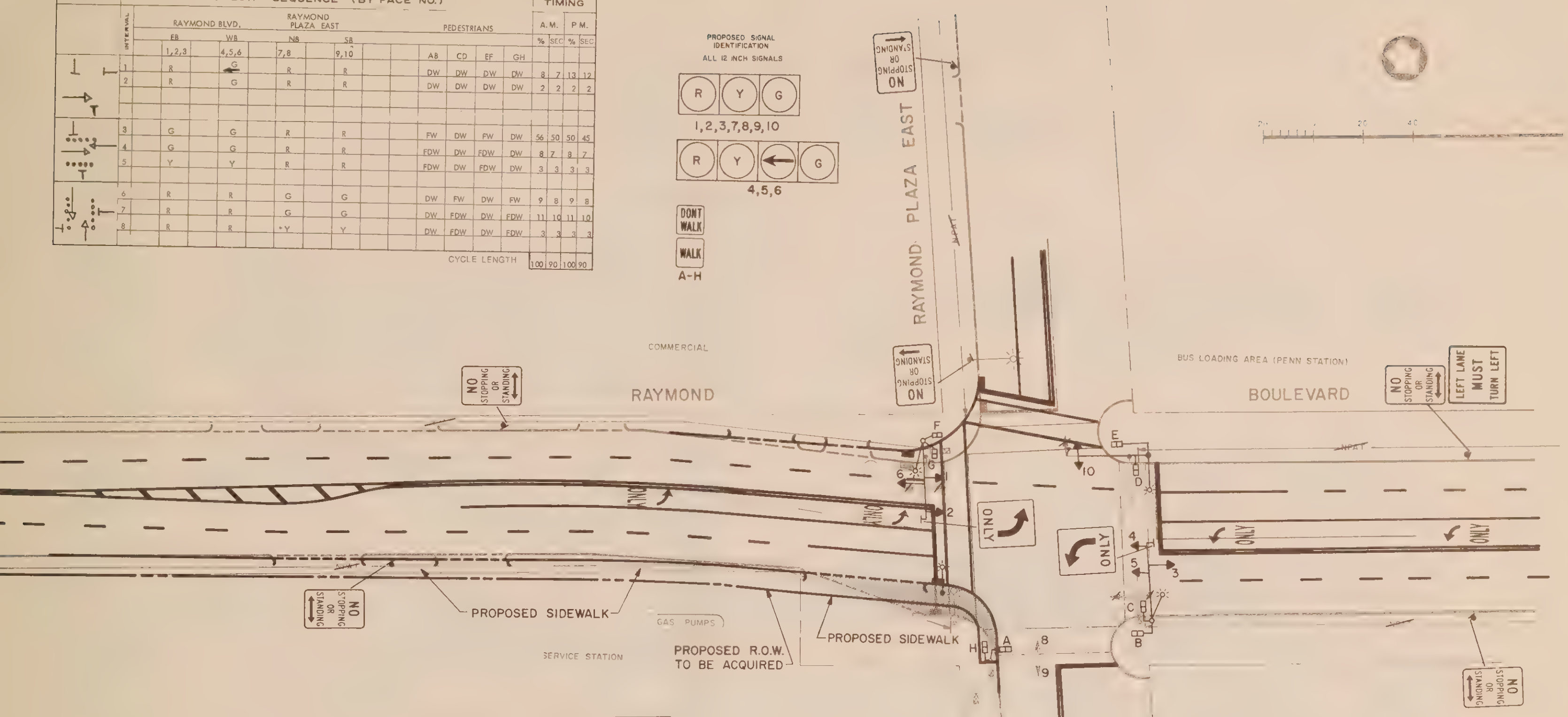
RAYMOND BOULEVARD AND RAYMOND PLAZA EAST

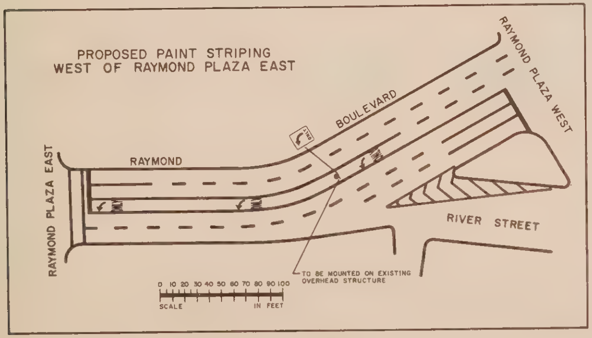
Problems	Recommendations
• Vehicles turning left from Raymond Boulevard into Raymond Plaza East reduce available through lanes causing excessive delays.	• Widen the east approach and provide left-turn lanes for both east and west approaches.
• Westbound left turns during the P.M. peak period from Raymond Boulevard are particularly heavy.	• Provide a left-turn advance for westbound traffic.
• Confusion exists as to the proper lane usage of available pavement.	• Provide adequate pavement markings on all approaches. Build curbs on northeast corner.
• Many of the accidents that have occurred at this intersection have been rear-end collisions.	• Provision of left-turn lanes should eliminate some accidents. Provide additional signal heads and 12" lenses to eliminate accidents caused by poor signal visibility.

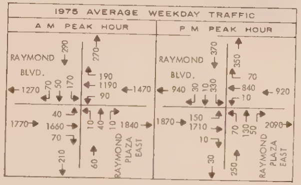
FIGURE 40

TRAFFIC SIGNAL OPERATIONS

PHASES	INTERVAL	COLOR SEQUENCE (BY FACE NO.) RAYMOND BLVD. EB 1,2,3	RAYMOND BLVD. WB 4,5,6	RAYMOND PLAZA EAST NB 7,8	RAYMOND PLAZA EAST SB 9,10	PEDESTRIANS AB	CD	EF	GH	TIMING A.M. %	A.M. SEC	P.M. %	P.M. SEC
	1	R	← G	R	R	DW	DW	DW	DW	8	7	13	12
	2	R	G	R	R	DW	DW	DW	DW	2	2	2	2
	3	G	G	R	R	FW	DW	FW	DW	56	50	50	45
	4	G	G	R	R	FDW	DW	FDW	DW	8	7	8	7
	5	Y	Y	R	R	FDW	DW	FDW	DW	3	3	3	3
	6	R	R	G	G	DW	FW	DW	FW	9	8	9	8
	7	R	R	G	G	DW	FDW	DW	FDW	11	10	11	10
	8	R	R	*Y	Y	DW	FDW	DW	FDW	3	3	3	3
									CYCLE LENGTH	100	90	100	90




PROPOSED PAINT STRIPING WEST OF RAYMOND PLAZA EAST


1975 AVERAGE WEEKDAY TRAFFIC

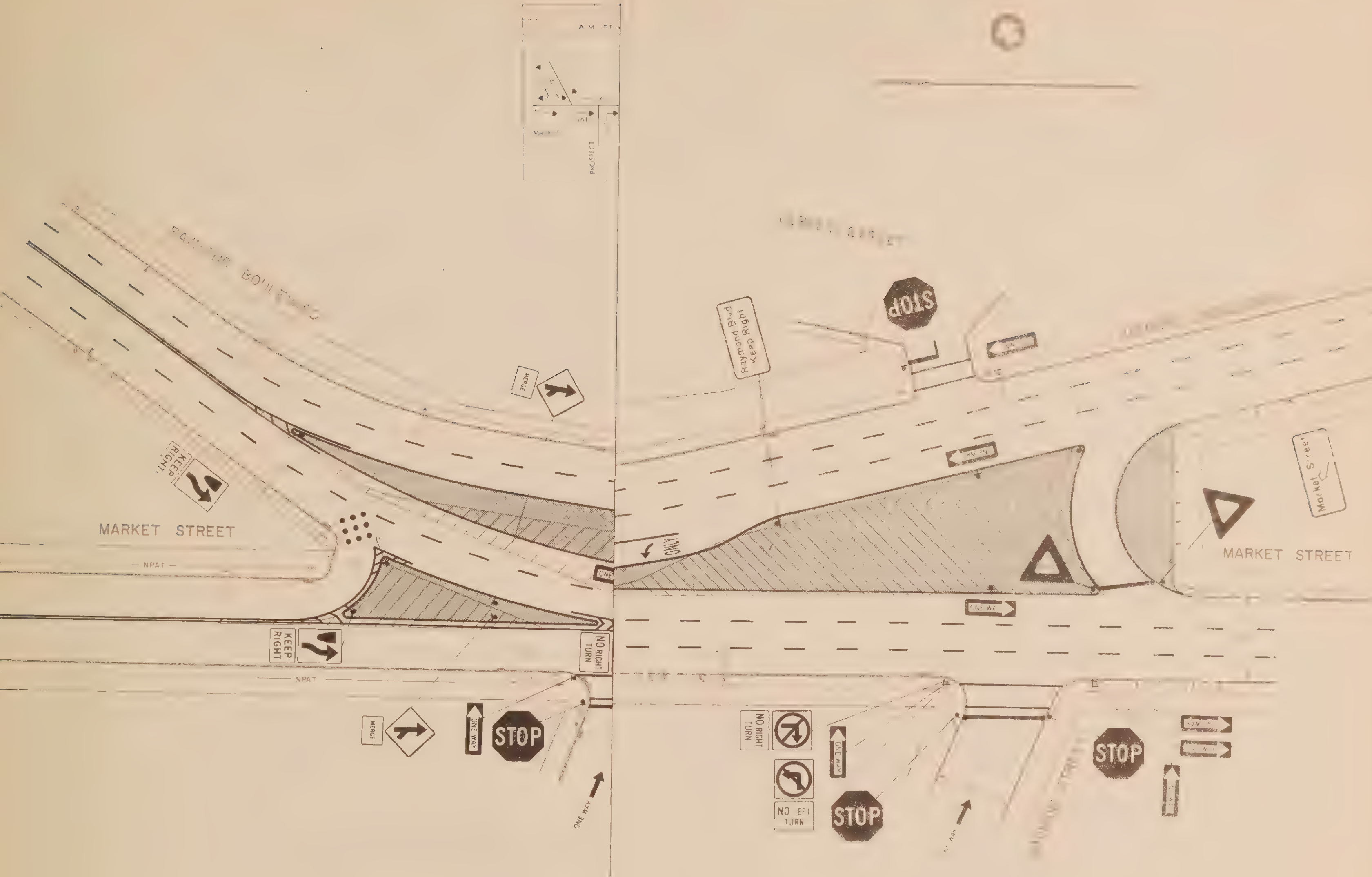
IMPROVEMENT LOCATION - 18

RAYMOND BOULEVARD AND RAYMOND PLAZA EAST

IMPROVEMENT LOCATION 19

RAYMOND BOULEVARD AND MARKET STREET

Problems	Recommendations
● Merging of eastbound traffic at the west end of the intersection may have caused many of the accidents on Market Street due to the abrupt nature of the merge.	● Channelize the intersection to provide continuous flow for traffic on both Raymond Boulevard and Market Street. Eliminate the existing left turn into Prospect Street (by reversing direction of Prospect and Congress Streets) to greatly reduce the hazard.
● The merge of three lanes to two lanes of westbound traffic at the west end occurs on the curve.	● Force traffic to merge before the curve by using channelization and making the left lane an exclusive left-turn lane to Congress Street.
● Traffic eastbound on Raymond Boulevard desiring to turn right into Prospect Street constitutes a hazard to through traffic on both Market Street and Raymond Boulevard, since these vehicles must first stop on Raymond Boulevard to check for traffic on Market Street and then cross Market Street at very nearly a right angle.	● Eliminate the turn from eastbound Raymond Boulevard to Prospect Street by reversing directions of Congress and Prospect Street as mentioned above.

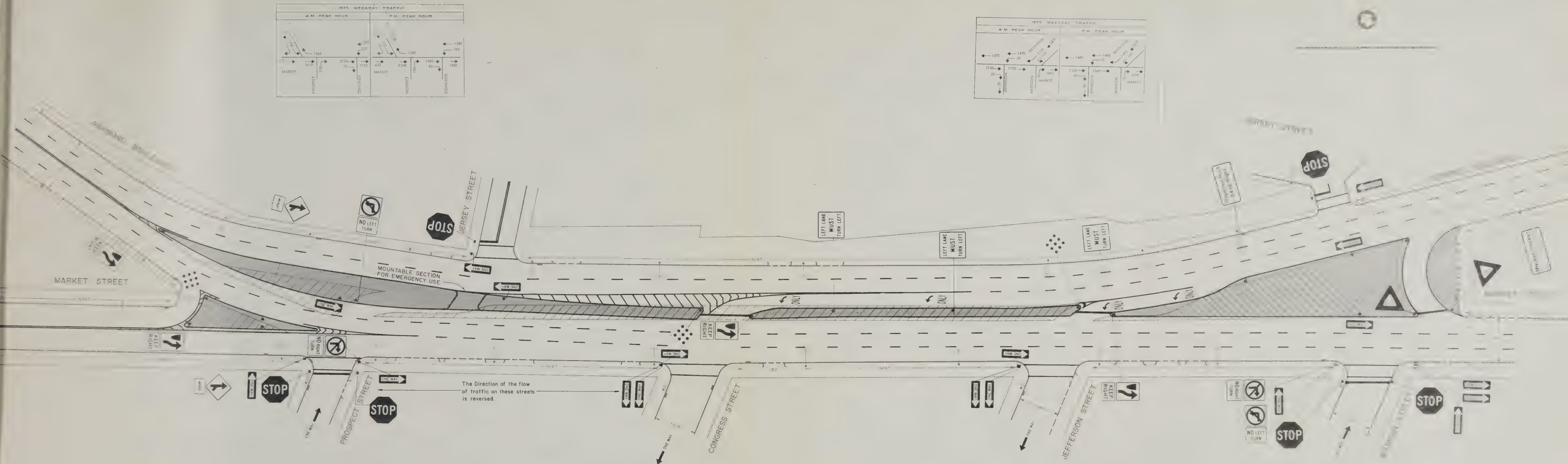

A.M. PE
PROSPECT
MARKET STREET
MARKET STREET
NPAT
NPAT
KEEP RIGHT
KEEP RIGHT
MERGE
MERGE
ONE WAY
STOP
STOP
STOP
STOP
Raymond Blvd Keep Right
Market Street
NO RIGHT TURN
NO RIGHT TURN
NO LEFT TURN
ONE WAY
ONE WAY
ONLY

IMPROVEMENT LOCATION 19

RAYMOND BOULEVARD AND MARKET STREET

Problems	Recommendations
• Merging of eastbound traffic at the west end of the intersection may have caused many of the accidents on Market Street due to the abrupt nature of the merge.	• Channelize the intersection to provide continuous flow for traffic on both Raymond Boulevard and Market Street. Eliminate the existing left turn into Prospect Street (by reversing direction of Prospect and Congress Streets) to greatly reduce the hazard.
• The merge of three lanes to two lanes of westbound traffic at the west end occurs on the curve.	• Force traffic to merge before the curve by using channelization and making the left lane an exclusive left-turn lane to Congress Street.
• Traffic eastbound on Raymond Boulevard desiring to turn right into Prospect Street constitutes a hazard to through traffic on both Market Street and Raymond Boulevard, since these vehicles must first stop on Raymond Boulevard to check for traffic on Market Street and then cross Market Street at very nearly a right angle.	• Eliminate the turn from eastbound Raymond Boulevard to Prospect Street by reversing directions of Congress and Prospect Street as mentioned above.

FIGURE 41



IMPROVEMENT LOCATION – 19

RAYMOND BOULEVARD AND MARKET STREET

IMPROVEMENT LOCATION 20

SOUTH STREET AND DELANCY STREET

Problems	Recommendations
• Currently there exist two exit ramps from northbound Routes 1 and 9, terminating at Delancy Street. The terminal of the westerly ramp is very close to the intersection of South Street (Stockton Street) and Delancy Street, causing serious problems in the operation of this intersection. This ramp carries only about 35 percent of the combined volume of traffic from both ramps.	• Prohibit exit from the express lanes of Routes 1 and 9 and direct all traffic to the exit from the local lanes. Appropriate signing to this effect can conveniently be placed on northbound Routes 1 and 9 in conjunction with signs directing trucks to use the local lanes at the crossover south of Delancy Street. Reconstruct the terminal of the remaining ramp with Delancy Street to include channelization and traffic signal control.
• Very heavy volumes of traffic on the east approach of the intersection are afforded insufficient roadway width.	• Widen Delancy Street on the south side to provide adequate roadway width to permit three approach lanes westbound, two on the eastbound approach, and exclusive left-turn lanes in both directions.
• Lack of channelization results in a confusing and dangerous operating pattern and many hazards to pedestrians.	• Construct channelizing islands for right-turn movements on south and east approaches.
• The left-turning movement at the south approach of the intersection causes delays and congestion.	• Prohibit left-turn movement on the South Street approach of the intersection. The movement thus eliminated may be made from South Street at more convenient locations.
• Insufficient roadway width on the north approach results in inadequate capacity.	• Widen this approach to provide two approach lanes.

Problems	Recommendations
● Lack of traffic signal indication at or near crosswalks hampers pedestrian safety. With the proposed reconstruction of the intersection the existing signal layout and operation will not be compatible.	● Reconstruct signal layout to provide adequate indications for vehicular and pedestrian traffic. Provide offset between the signals at the exit ramp and at South Street to assure progressive east to west movements from the exit ramp through the South Street (Stockton Street) intersection.

NOTE: Since the closing of the express lanes ramp may affect traffic on U.S. 1 and 9, and investigation of this effect was beyond the scope of this study, it is recommended that a feasibility study be carried out for this project prior to implementation. A plan for this project will be furnished by the City after completion of the feasibility study and agreement on all aspects of the project affecting U.S. 1 and 9.

REVERSIBLE LANE PROJECTS

Two reversible lane operations presently exist as part of the Newark Street system: (1) Broad Street between Central Avenue and Clay Street, and (2) Market Street between Mulberry Street and Washington Street. Broad Street provides access to and from the Newark CBD in a north-south direction, while Market Street is a primary east-west route for travel within the CBD as well as to outer areas of the City.

Broad Street between Central Avenue and Clay Street

Existing Conditions: During peak hours, reversible lanes (two center lanes) are assigned in the direction of major flow, southbound in the a.m. and northbound in the p.m. In the off-peak hours, each direction is afforded one of these travel lanes.

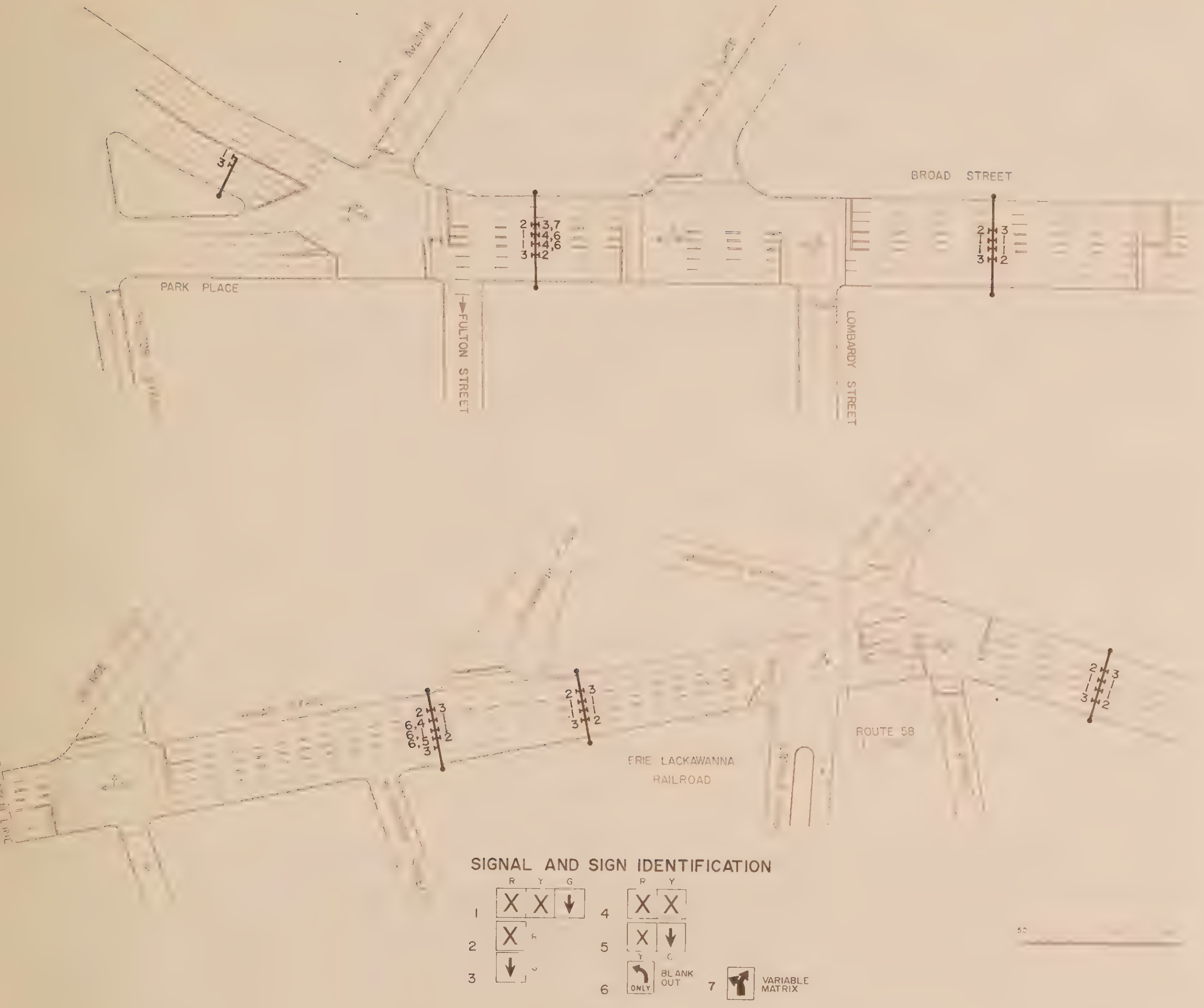
Under off-peak conditions, Broad Street between Central Avenue and Lackawanna Avenue provides a four-lane roadway in each direction except that there are three lanes southbound between Washington Street and Lackawanna Avenue. There are three lanes in each direction between Lackawanna Avenue and Clay Street. To demarcate the reversible lanes in relation to major traffic flows during the peak hours, cones are placed intermittently along the dividing line between directional flows. Also in these time periods, no parking is allowed on both sides of Broad Street.

The cones do not offer adequate indication to motorists of the proper lane usage. In fact, motorists tend to respect the brick centerline along Broad Street, rather than following the reversible lane markings. Part of this problem can be attributed to faded, undefinable pavement markings, leaving the brick centerline as the only clear indicator of lane boundaries. Existing parking signs are also in deteriorated condition resulting in improper interpretation of regulations, especially critical during the peak a.m. and p.m. periods.

Recommendations: To create a more permanent reversible lane configuration and provide motorists with a greater awareness of this operation, it is recommended that overhead lane signals be installed and coordinated by connection to a master controller. This system should clearly indicate proper lane use and eliminate the need for manual placement of cones. Green arrows will designate proper lanes for traffic use in each direction and red X's will mark lanes to be avoided. A yellow X is recommended to indicate the clearance period after showing a green arrow when direction of flow is being changed on one of the reversible lanes.

Line fading can be eliminated through the utilization of thermoplastic lane markings. In addition, the brick centerline, which presently causes driver confusion, should be removed and repaved. Vehicular obstruction of traffic flow can be alleviated by installing new parking signs and initiating a periodic review and maintenance program to insure legibility of sign messages.

The lane control signals provide a degree of flexibility and dependability unattainable with the present manual cone system. Recommendations initially call for signal control via time clocks; eventually, the reversible lane operation could be governed by the traffic volumes themselves, through employment of a volume-density controller.



REVERSIBLE LANE PROJI

BROAD STREET BETWEEN CENTRAL AVENUE ANI

markings, leaving the brick centerline as the only clear indicator of lane boundaries. Existing parking signs are also in deteriorated condition resulting in improper interpretation of regulations, especially critical during the peak a.m. and p.m. periods.

Recommendations: To create a more permanent reversible lane configuration and provide motorists with a greater awareness of this operation, it is recommended that overhead lane signals be installed and coordinated by connection to a master controller. This system should clearly indicate proper lane use and eliminate the need for manual placement of cones. Green arrows will designate proper lanes for traffic use in each direction and red X's will mark lanes to be avoided. A yellow X is recommended to indicate the clearance period after showing a green arrow when direction of flow is being changed on one of the reversible lanes.

Line fading can be eliminated through the utilization of thermoplastic lane markings. In addition, the brick centerline, which presently causes driver confusion, should be removed and repaved. Vehicular obstruction of traffic flow can be alleviated by installing new parking signs and initiating a periodic review and maintenance program to insure legibility of sign messages.

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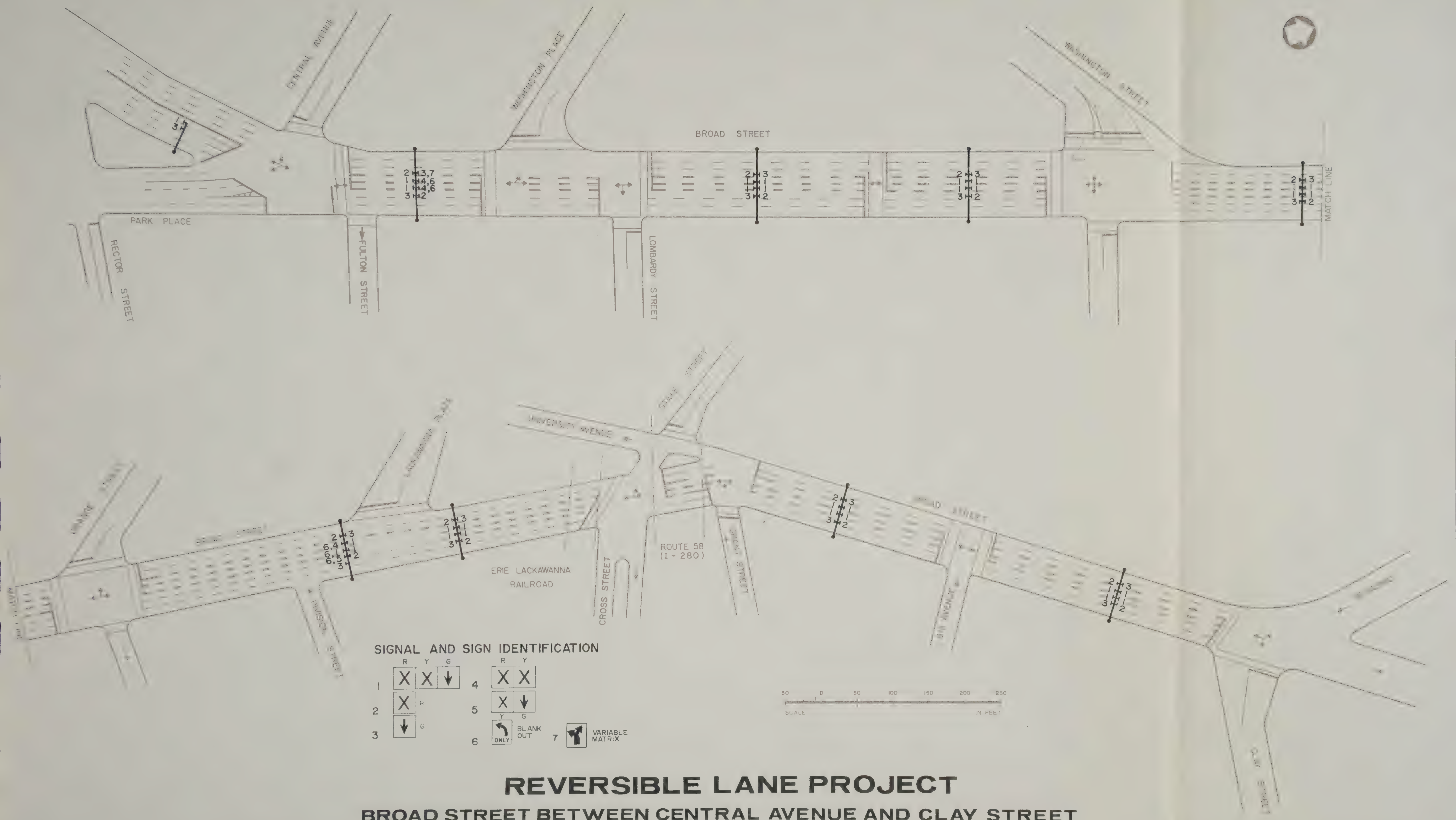


REVERSIBLE LANE PROJECT

BROAD STREET BETWEEN CENTRAL AVENUE AND CLAY STREET

Market Street between Mulberry Street and Washington Street

Existing Conditions: For most of the day, Market Street operates with two lanes eastbound and two lanes westbound with parking allowed on the eastbound side. Parking is always prohibited on the westbound side except in the off-peak hours when stopping and loading is permitted in some areas.

During the p.m. peak hour, however, this configuration shifts to three westbound lanes, with the westbound curb lane becoming an exclusive bus lane. In the a.m. peak hour, on the other hand, neither parking nor stopping and standing are allowed along the eastbound curbside to provide three eastbound lanes.

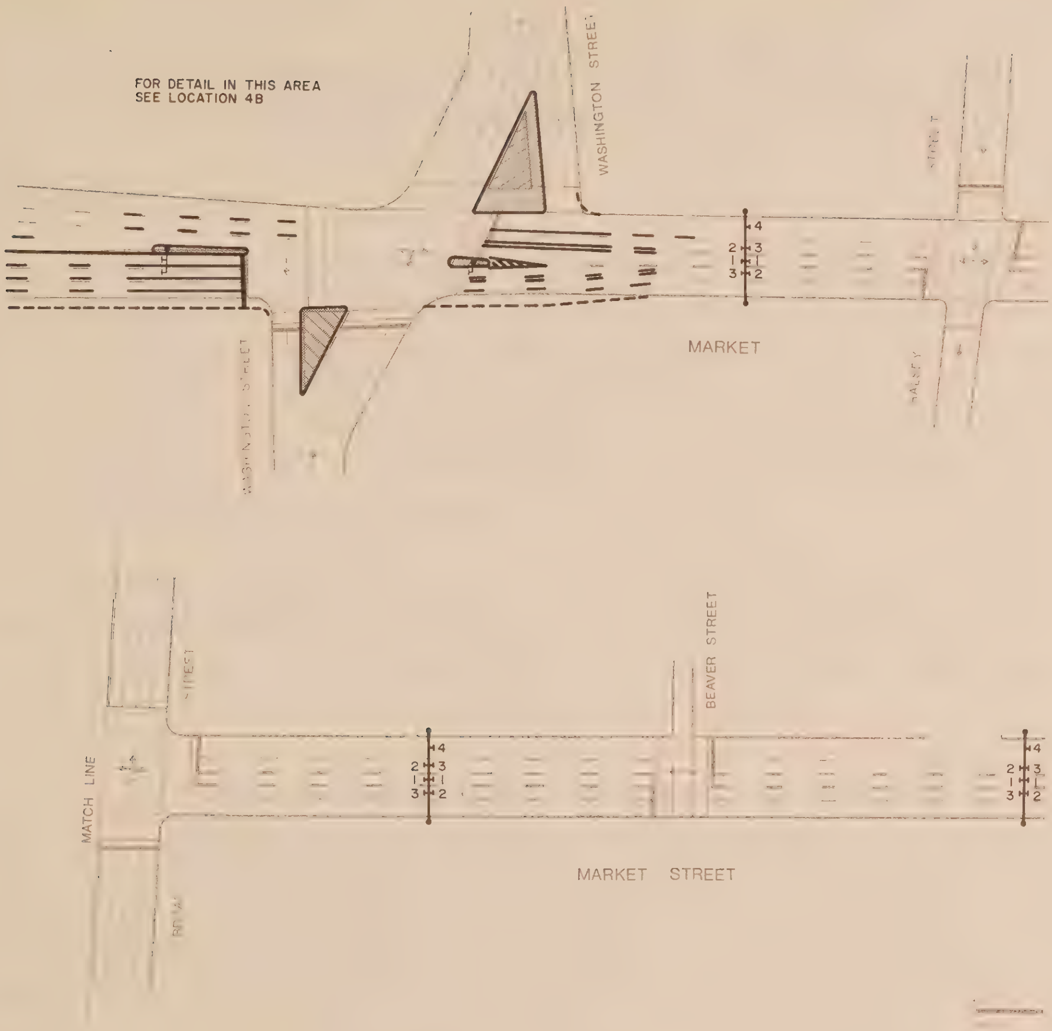
Traffic cones are placed down the south side of the center line during the peak p.m. hour to divide eastbound and westbound traffic. For the remainder of the day, lane pavement markings suffice for direction guidance.

Existing lane markings and cone placement do not offer sufficient indication to motorists of proper lane use. As found on Broad Street as well, due to faded markings, the existing brick centerline is respected, which reduces the effectiveness of the reversible lane operation. Parking signs are also in poor, undefinable condition, which results in lack of adherence to existing regulations.

Recommendations: To clearly indicate proper lane use and eliminate cone placement, overhead lane signals should be installed. They would be coordinated and wired to a master controller for effective reversible lane operation. Operation would be in a similar manner to the system on Broad Street.

It is recommended that the brick centerline along Market Street be removed and paved over to eliminate any further motorist confusion as to lane use. Also, to eliminate lane fading, thermoplastic lane markings should be installed. Further vehicular confusion and potential conflict can also be mitigated through installation of new parking signs in conjunction with a periodic review and maintenance program to insure legibility of sign messages.

As with the proposed Broad Street lane control signals, those recommended for Market Street can achieve a degree of flexibility and reliability far above present usage of cone markings. Governing of the system with time clocks is initially recommended; provision is made for eventual employment of volume-density controllers in the system for increased compatibility of operations with traffic conditions.



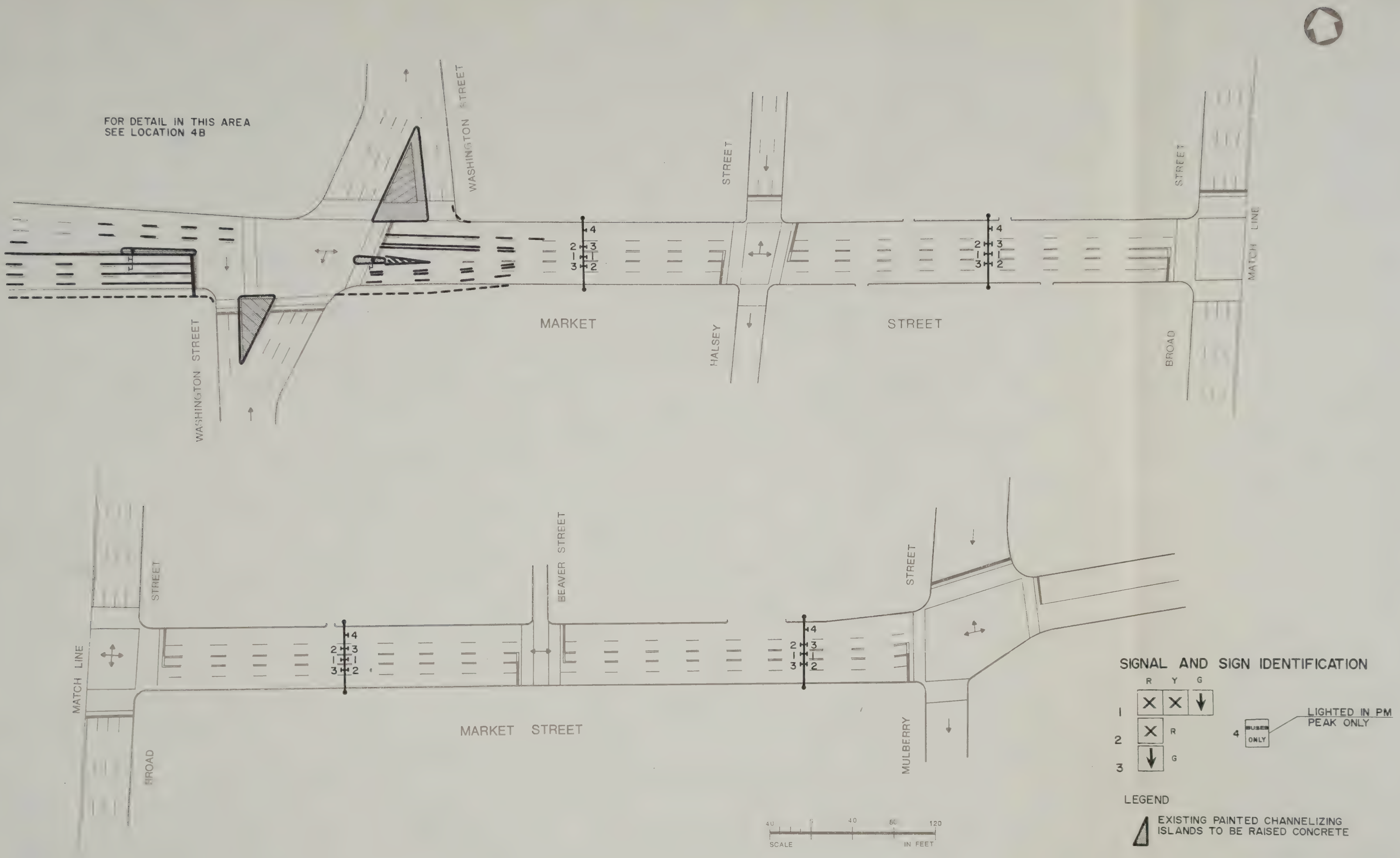
REVERSIBLE LANE PROJ

MARKET STREET BETWEEN MULBERRY STREET AND V

It is recommended that the brick centerline along Market Street be removed and paved over to eliminate any further motorist confusion as to lane use. Also, to eliminate lane fading, thermoplastic lane markings should be installed. Further vehicular confusion and potential conflict can also be mitigated through installation of new parking signs in conjunction with a periodic review and maintenance program to insure legibility of sign messages.

As with the proposed Broad Street lane control signals, those recommended for Market Street can achieve a degree of flexibility and reliability far above present usage of cone markings. Governing of the system with time clocks is initially recommended; provision is made for eventual employment of volume-density controllers in the system for increased compatibility of operations with traffic conditions.

FIGURE 43



REVERSIBLE LANE PROJECT

MARKET STREET BETWEEN MULBERRY STREET AND WASHINGTON STREET

REVERSIBLE STREET PROJECT
RAYMOND BOULEVARD FROM MULBERRY STREET TO WARREN STREET
AND WARREN STREET FROM RAYMOND BOULEVARD TO WEST MARKET STREET

Existing Conditions

Raymond Boulevard and Warren Street are continuous thoroughfares operating as periodic reversible one-way streets during peak periods in a primarily retail commercial area. This operation provides east-west access between the "downtown" area and the city limits to the west. A significant amount of vehicles travel these streets, performing through movements. Raymond Boulevard functions as an eastbound four-lane, one-way street from Warren Street to Broad Street during a.m. peak periods and reverses its flow to one-way westbound from Mulberry Street to Warren Street during p.m. peak periods.

Warren Street operates in the same direction as Raymond Boulevard during similar peak periods between Raymond Boulevard and West Market Street, providing a continuous one-way flow. During off-peak periods, both streets function as four-lane, two-way streets with parking allowed on both sides of Warren Street during off-peak hours.

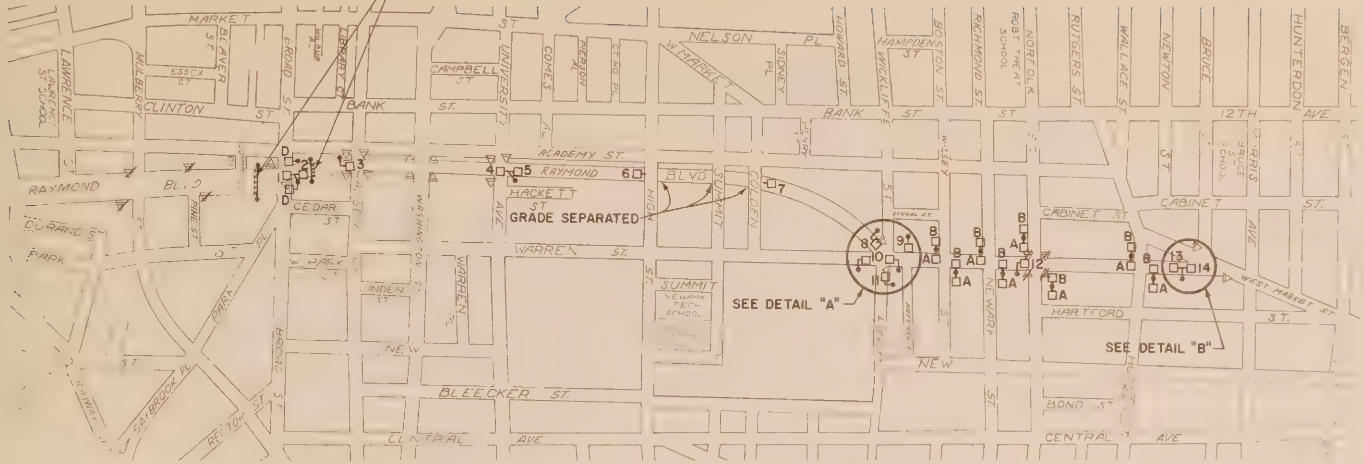
This reversible street configuration creates significant operational problems, however. There exists no clear indication to those already traveling on the reversible roadway as to the exact time when flow is changing from one- to two-directional or vice versa. Also, a clearance interval is nonexistent to restrict access to the system in the wrong direction and at the same time to direct wrong-way vehicles on the roadway to clear before conversion to one-way or two-way flow.

Regulatory signs are conspicuously absent along the subject roadway to warn motorists of transitions to two-way flow. This lack of signing jeopardizes safety and causes driver confusion. Existing painted two-directional one-way signs for minor streets are inadequate as well, being frequently twisted or damaged and requiring lengthy perception time, which creates driver confusion and safety hazards.

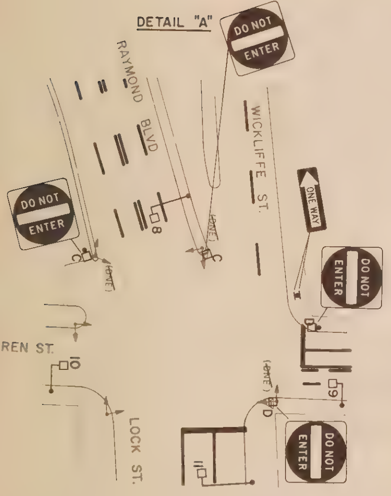
Recommendations

- To eliminate problems of demarcation relating to this reversible operation, it is recommended that illuminated overhead variable matrix signing be installed at key locations within the reversing roadway system to display "one-way, use all lanes" and other messages as appropriate for various traffic conditions. It is proposed to operate this signing during one-way flow periods and before and after change-overs, but not during regular two-way operation.
- Establishment of a clearance interval prior to directional conversion can be achieved through initiation of the display of "Do Not Enter" signs for wrong-way traffic at key positions in the system five minutes in advance of conversion to one-way flow. Display of signs indicating two-way flow for five minutes after conversion to original flow conditions is recommended to eliminate possible driver confusion as to roadway situation immediately after this change.
- Overhead regulatory signs should be provided at the beginning and end of one-way sections of the roadway to reduce safety hazards and insure a smooth transition between one- and two-way streets. In addition, the painted one-way signs are to be supplemented by electrically operated variable matrix one-way signs to reduce illegal turning movements or wrong-way travel. Painted one-way signs should be retained as a safety feature in case of failure of the electrical apparatus and also to serve as information regarding the reversible lane schedule.

SEE BROAD ST. AND RAYMOND BLVD. INTERSECTION IMPROVEMENT PLAN FOR DETAILS OF LANE CONTROL SIGNING



DETAIL "A"



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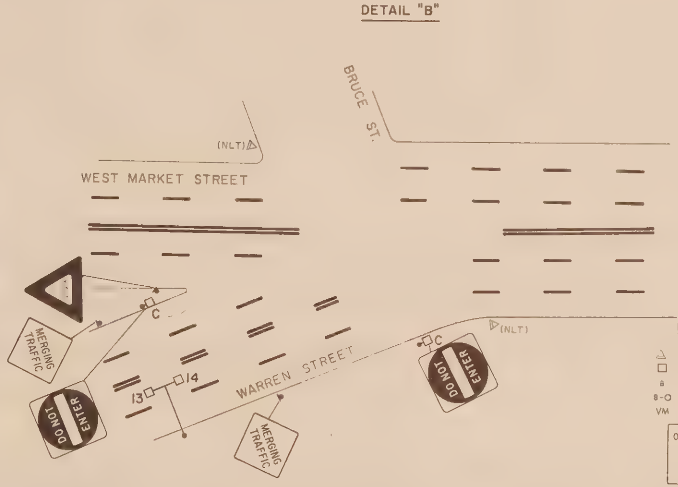
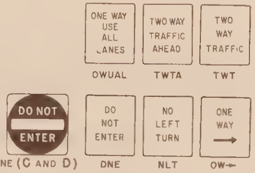


LEGEND

EXISTING ILLUMINATED SIGN
PROPOSED ILLUMINATED SIGN
B BLANK
B-O BLANK OUT SIGN
VM VARIABLE MATRIX SIGN

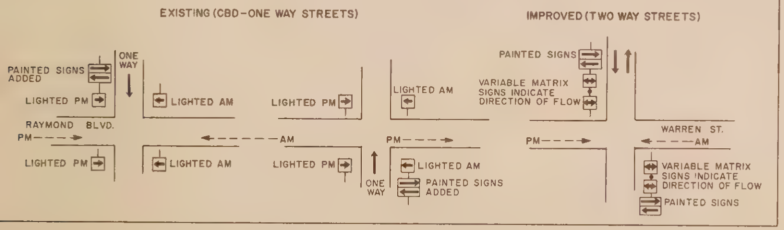


ILLUMINATED SIGNS
TIMING CHART

Sign Code	Sign Type	Time Before 655	655-700	700-900	900-905	905-355	355-400	400-600	600-605	After 605
1	VM	B	DNE	DNE	DNE	B	B	OW UAL	TWT	B
2	B-O	B	B	TWTA	TWTA	B	B	B	B	B
3	B-O	B	B	B	B	B	DNE	DNE	DNE	B
4	VM	B	DNE	DNE	DNE	B	B	OW UAL	TWT	B
5	VM	B	B	OW UAL	TWT	B	B	B	B	B
6	VM	B	B	B	B	B	B	OW UAL	TWT	B
7	VM	B	B	OW UAL	TWT	B	B	B	B	B
8	VM	B	B	OW UAL	TWT	B	DNE	DNE	DNE	B
9	VM	B	DNE	DNE	DNE	B	B	OW UAL	TWT	B
10	B-O	B	B	TWT	TWT	B	B	B	B	B
11	B-O	B	B	B	B	B	B	TWT	TWT	B
12	VM	B	B	OW UAL	TWT	B	DNE	DNE	DNE	B
13	VM	B	DNE	DNE	B	B	B	TWTA	TWT	B
14	VM	B	B	OW UAL	TWT	B	DNE	DNE	DNE	B
A	VM	B	B	OW ←	B	B	B	OW →	B	B
B	VM	B	B	OW →	B	B	B	OW ←	B	B
C	B-O	B	B	B	B	B	DNE	DNE	DNE	B
D	B-O	B	DNE	DNE	DNE	B	B	B	B	B

NOTE - EXISTING BLANK-OUT ONE-WAY SIGNS TO SH[illegible] "A" AND "B". EXISTING BLANK-OUT NO LEFT TU[illegible] AND WARREN, SEE DETAIL "B") TO BE LIGHTED 3-55 [illegible]

RECOMMENDED TYPICAL INSTALLATIONS



REVERSIBLE STREET PROJECT
RAYMOND BOULEVARD AND WARREN STREET

SIGNS AND MARKINGS

General

Uniformity of signs, signals and markings is a major factor in establishing preferable traffic operations practices. Inconsistency in the application of these devices give rise to driver confusion and a subsequent lack of respect for their intent, and could contribute to unnecessary accidents and congestion. Existing signing and marking practices in Newark, like most other communities, are in need of revision.

The 1971 edition of the Manual on Uniform Traffic Control Services adopted new standards for signs and markings. The major revisions required of Newark are related to the use of the new paint marking standards for lane striping. Center lines, previously primarily white, will be double yellow lines. Thus, as old pavement markings are renewed, the new standards should be applied. Thermoplastic lane lines, recommended in certain critical areas for their durability and high visibility, should be considered for a wider degree of usage.

The Manual also adopted pictorial message signs with educational, verbal legends. As existing signs become worn or are vandalized, they should be replaced with signs of the new, pictorial type. Many existing STOP signs presently placed below the minimum height of seven feet recommended to insure visibility over parked vehicles should be raised. Other major revisions directed at upgrading Newark's sign inventory follow.

The majority of the minor signing and marking revision recommendations are associated with conformance to Newark's Traffic Ordinance. Existing signs and supplementary paving markings directed at restricting curb parking, for example, are not all in agreement with the restrictions given in the Ordinance. Such inconsistencies must be identified and eliminated in order to promote safe traffic operations practices. Also, some signs convey messages which are ambiguous (i.e., "Light Traffic Street") and should also be replaced with uniform control devices.

Street Name Signs

Existing street name signs throughout the City of Newark are generally inadequate to safely and effectively serve the street identification needs of motorists. The existing signs are of varying design and color format and physical condition, with street name letter heights of three inches or less and many signs are missing entirely. As a result, street identification from the roadway is either impossible or very difficult.

Considering these inadequacies together with City desires to provide for improved identification on the entire street system, it is recommended that existing street name signs at the approximately 1400 intersections on the recommended Federal-Aid System be upgraded under the TOPICS program.

To adequately meet motorist needs, it is recommended that all street name signs be provided in conformance with Section 2D-40 of the Manual on Uniform Traffic Control Devices. For the Central Business District and major traffic streets, signs should be provided at least on diagonally opposite corners so that they will be on the far right-hand side of the intersection for traffic on the major street.

REGULATIONS AND ENFORCEMENT

Regulations related to traffic operation practices are contained in Title 23, "Traffic and Parking", and Title 24, "Transportation", of the Revised Ordinances of the City of Newark, New Jersey, 1966, as amended and supplemented. Changes in these ordinances will be necessary to conform to the recommendations of the TOPICS program as outlined in the project descriptions and plans. In particular, schedules listing one-way streets, turning prohibitions, parking, and stopping and standing generally will need amendment.

Assessment of overall enforcement of traffic ordinances in Newark reveals an extremely lax condition. For example, many cases of cars parked illegally, vehicles making prohibited turns, and total motorist disregard of traffic signals were observed during the TOPICS reconnaissance and operational surveys. Therefore, it is strongly recommended that enforcement of traffic ordinances be increased.

Illegal parking is a serious cause of traffic congestion; the casual disregard of traffic regulations is undoubtedly also a factor in Newark's high accident rate (see Table 3). Also, lack of enforcement tends to lead to disrespect for the law and a general breakdown of intended traffic operation.*

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*The highly detrimental effect of a general disregard for traffic regulations is well documented for the Newark intersection of Raymond Boulevard and McCarter Highway in NCHRP Report 113, "Optimizing Flow on Existing Street Networks" (Highway Research Board, Washington, D.C., 1971) pages 21, 195-213.

In addition to increased enforcement, it is necessary to structure regulations to reflect existing traffic needs so that motorists do not develop disrespect for regulations because of their irrelevance. Particularly in regard to parking it may be possible to eliminate some restrictions that currently are not being observed anyway, without causing undue congestion or accident potential.

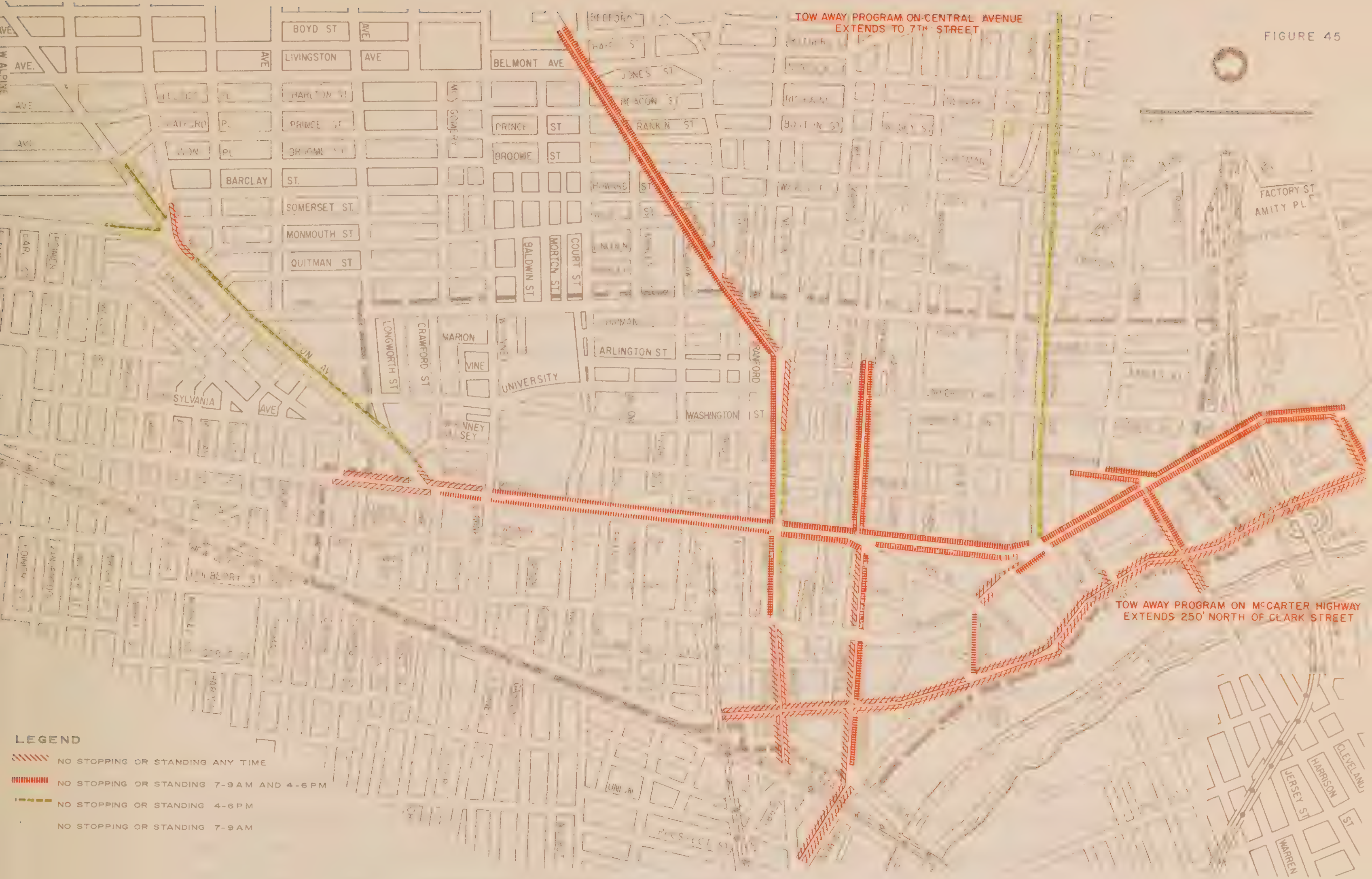
Tow-Away Program

The most critical areas in need of parking enforcement in the CBD are shown in Figure 6. These areas are recommended to be subject to a very active tow-away program during the working day hours, especially during the morning and evening peaks. At the present time, a single parked car along one of the critical streets will create heavy queues. Therefore, it is essential that all parked or stopped vehicles be quickly eliminated from the indicated streets during the periods shown in order to provide a sufficient capacity condition during the 7 a.m.-6 p.m. period. It is also recommended that new "NO STOPPING OR STANDING" signs be posted along all of the streets as shown in Figure 45 to emphasize the applicable parking restrictions. "Tow-Away Zone" should be added at the top of each sign. In some cases existing parking ordinances will need modification to conform to the requirements of the recommended tow-away program. A Newark ordinance provides for towing vehicles illegally parked (23:5-11) but it is recommended that the fine levied in addition to costs and garage charge be a minimum of $25 for the indicated streets.

Morning Peak Time Period

Peak-hour parking restrictions for the a.m. rush hour cover the period of 7:00-9:00 in some locations and 7:00-9:30 in others. It is advantageous in establishing signal progression if parking restrictions are uniform within the coordinated network and, since traffic very rarely peaks after 9 a.m., it is recommended that the morning parking restrictions be uniformly in effect during the period of 7:00-9:00 a.m.

FIGURE 45



TOW AWAY PROGRAM

Bus Stop Locations

While many bus stop locations are established by City Council resolution, there are also many transit routes that do not have bus stops thus established. The TOPICS projects shown in this report include bus stop recommendations at the critical locations studied. It is recommended that, since bus transit is a major and necessary form of travel in Newark, all bus routes be analyzed to establish the most advantageous bus stop locations to improve transit service and promote the best overall traffic flow. Consideration should be given to greater use of far-side bus stop locations. Existing resolutions should be reviewed to change the undesirable locations and to designate appropriate bus stops for routes which have no official stops. In addition, proper bus stop signs should be posted at all locations. To facilitate the relocation of bus stops, it is recommended that the Newark City Council authorize bus stops to be established by regulation recommended by the City Traffic Engineer rather than resolution, which is permitted by New Jersey law.

Accident Records

An effective program to mitigate accident frequency requires an effective program of accident reporting. There exist numerous measures which should be undertaken to improve the accident reporting system in Newark.

The most significant improvement is to include in the Newark Police files punch card record of each accident indication of intersection approach and direction of travel of each vehicle, and behavior of other involved vehicles. This system will make possible accident analysis from computer printouts of accident data, rather than using an extremely cumbersome system of retrieving the original accident report documents.

Secondly, Newark needs a system to identify the location of mid-block accidents on a similar punch card record. At the present time, mid-block accidents can only be summarized by street names. Since each street length varies and there is no detailed identification of high accident locations, a readily available means to analyze mid-block accidents is nonexistent. A method of identifying critical non-intersection accident locations could be provided if the name of the nearest cross street to the east or south of each accident location was recorded on each punch card record.

Thirdly, accident reporting in Newark should be all-inclusive. At the present time only the most significant accidents in terms of property damage and personal injury are being reported; this condition is evidenced by the fact that Newark records include only about 50 percent of those accidents recorded in State Department of Motor Vehicles files. The remaining accident reports consist primarily of those submitted by motorists to the Department of Motor Vehicles under the legal requirement of reporting when death, injury, or more than $200 damage is involved.

While State data can be used for accident analysis (and was employed for detailed analysis of individual locations in this TOPICS Study), it is undesirable to depend upon volunteer compliance with the law by motorists for such a large percentage of accidents. Also, for effective accident prevention programs, it is often helpful to have reports of accidents with property damage less than $200.

It should be noted that the present practice of printing out annual accident summaries by street names and by intersection locations alphabetically and by degree of hazard is very helpful to determine the most critical intersections. This listing can then be combined with mid-block accidents printed out by name of street and the nearest cross street to offer the utmost detailed information.

Approvals

Title 39 of the Revised Statutes, State of New Jersey, requires approval of all city ordinances, resolutions or regulations affecting traffic or traffic conditions by the Commissioner of Motor Vehicles or the Traffic Commission (39:4-8). Newark city ordinances involving one-way streets, prohibited turns, limiting use of streets to certain vehicles, and parking are published in a book, "Revised Ordinances of the City of Newark, New Jersey, 1966", and are properly approved. All changes in these ordinances since 1966 have also been State approved.

Stop signs are authorized by City resolutions designating through streets. (Streets crossing through streets may have stop signs.) State approvals of through streets have been kept current.

Bus stops are authorized by City resolution and approved but, as noted previously, are not complete, and should be reviewed in their entirety. Also, it has been recommended that bus stops be established by regulations recommended by the City Traffic Engineer.

Loading zones are now authorized by regulations recommended by the City Traffic Engineer. These regulations have State approval through October of 1971.

Traffic signals have State approval in part, but there are a great many signals operating without the proper approval, and some are not presently warranted. As explained under "Traffic Signal Approvals", page 32, all signals involved in the TOPICS program have been examined for meeting legal and warrant requirements. The status of these signals is shown in the section on signal approvals and it is recommended that the proper approval be sought for all warranted signals.

It should be noted that Section 39:4-197.2 of the Revised N.J. Statutes requires County approval of City traffic ordinances, resolutions and regulations applying to County roads. Jurisdiction over a number of City streets has been transferred to the County in recent years, but there are no records of County approvals for City regulation of traffic and parking on county roads.

SYSTEM MAINTENANCE

To realize the full potential of the TOPICS program, provisions must be made to properly maintain proposed, as well as existing traffic control equipment. The addition of traffic signals utilizing sophisticated detection equipment and controller hardware, together with the modernization and interconnection of some existing traffic signals, will require an effective ongoing maintenance program.

The City of Newark needs a stronger traffic engineering organization. Present plans to include traffic engineering under a proposed Engineering Department should insure this activity of a proper place in the City organizational structure. However, it is apparent that the traffic engineering function is presently very understaffed for a central city of 380,000 population in an urban area of over 1,800,000 population. A staff of 9 professional traffic engineers can be justified (2.5 per 100,000 population*) for Newark as compared to two existing presently.

It is also apparent that the supporting staff of draftsmen, investigators, clerks and maintenance personnel needs to be increased to do an adequate job in a City of Newark's size and especially considering its position as the most "commuted-to" major city in the United States for its size.

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* Capelle, Cleveland and Rankin, Editors, An Introduction to Highway Transportation Engineering (1968), page 156.

It is recognized that Newark's financial limitations make a fully staffed traffic engineering function difficult to achieve but steps should be taken to study and strengthen this function, perhaps with Federal, State or County aid, since Newark services a large proportion of trips made by persons residing outside the City.

In order that the proposed TOPICS program should not further overload existing maintenance functions it is recommended that an additional three-man crew equipped with a truck and snorkel device, with at least one person trained and experienced in overhead control mechanism and variable matrix equipment, be added to the City staff when the early implementation program is carried out. In addition, at least one additional professional traffic engineer should be added to supervise the proposed coordinated signal systems. It is estimated that the additional salaries, overhead and expenses for these services will be approximately $50,000 annually.

EVALUATION OF TOPICS IMPROVEMENTS

After a sufficient period following implementation of the recommended improvements, evaluation of selected locations, which would have various traffic problems characteristic to the study area, should be conducted by a qualified traffic engineer to determine the effectiveness of the TOPICS program in its purpose of increasing capacity and safety. This evaluation may be made by the City Traffic Engineer, and it would provide valuable experience in dealing with similar problems in the future.

Included in this continuing process would be the recording of periodic traffic counts at the locations in question to ascertain any changes in volume, traffic composition and turning movements which may arise. Observation of queuing and other signs of congestion will play an important role in maintaining proper signal adjustment as well as identifying changed traffic conditions.

IMPLEMENTATION

COST ESTIMATES

Cost estimates were made for all recommended improvements based upon 1971 unit costs derived from information obtained from the New Jersey Department of Transportation and manufacturer's price listings; Table 6 lists the estimated costs for each corridor improvement and spot improvement project. Total costs for all projects is $4,000,000 (1971 prices).

Estimates of projects scheduled for future years have taken account of price rises due to inflation. An estimated rate of 5 percent per year was utilized for each year 1972 to 1978. Comparison of actual price data for 1971 and 1972 reveal an approximate increase of 14 percent between the two years; this increase was also included in the estimates for future years.

Right-of-way cost estimates have been provided by the City of Newark and these are assumed to hold constant through the 5-year construction period.

Acquisitions for rights-of-way on all highway projects must comply with the following statutes:

State: Chapter 361, Laws of N.J. 1971. Assembly Bill No. 504, approved December 21, 1971.
"Eminent Domain Act of 1971."

Chapter 47, Laws of N.J. 1972. Senate Bill No. 987, approved June 1, 1972.
"Uniform Transportation Replacement Housing and Relocation Act."

Federal: Public Law 91-646, 91st Congress. Senate Bill No. 1, approved January 2, 1971.
"Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970."

The recommended TOPICS program includes some street repaving work which should be done in conjunction with certain projects. Since this repaving work probably cannot be funded under TOPICS, these repaving items have been listed separately with the associated TOPICS improvement.

TABLE 6

NEWARK TOPICS COST SUMMARY

PROJECT	ID	1971 CONSTR. COST	R.O.W. COST	ESTIMATED CONSTRUCTION COST BY YEARS 1974	1975	1976	1977	1978	TOTAL COST
FRELINGHUYSEN AV CORRIDOR	1	92,500						140,100	140,100
SUBTOTAL		92,500						140,100	140,100
CLINTON AVENUE CORRIDOR	2								
HAYES CIRCLE	2A2B	71,050				97,600			97,600
HIGH STREET	2C	23,850				32,800			32,800
WASHINGTON STREET	2D	40,650				55,800			55,800
BROAD ST AT LINCOLN PARK	2E	42,150				57,900			57,900
SUBTOTAL		177,700				244,100			244,100
WASHINGTON-UNIV CORRIDOR	3	24,500					35,300		35,300
WASHINGTON AT W KINNEY ST	3A	28,900					41,700		41,700
WASHINGTON ST REPAVING		25,000					36,100		36,100
SUBTOTAL		78,400					113,100		113,100
SPRINGFLD-MARKET CORRIDOR	4A4B	83,050		31,000		79,900			110,900
SUBTOTAL		83,050		31,000		79,900			110,900
CENTRAL AVENUE CORRIDOR	5	7,000					10,100		10,100
CENTRAL AT WEST MARKET ST	5A	40,000					57,700		57,700
SUBTOTAL		47,000					67,800		67,800
BROAD STREET CORRIDOR	6								
CENTRAL AVENUE	6A	23,150		28,800					28,800
WASHINGTON STREET	6B	24,850		31,000					31,000
CLAY STREET	6C	39,900		49,700					49,700
SUBTOTAL		87,900		109,500					109,500
MCCARTER HIGHWAY CORRIDOR	7	5,600			7,300				7,300
LOMBARDY PLACE	7A	23,850			31,200				31,200
BRIDGE STREET	7B	25,800	9,000		33,800				42,800

TABLE 6

NEWARK TOPICS COST SUMMARY

PROJECT	ID	1971 CONSTR. COST	R.O.W. COST	ESTIMATED CONSTRUCTION COST BY YEARS 1974	1975	1976	1977	1978	TOTAL COST
CLAY STREET	7C	47,950	24,000		62,700				86,700
CLAY ST REPAVING		10,000			13,100				13,100
SUBTOTAL		115,200	33,000		147,100				181,100
BLOOMFIELD AVE CORRIDOR		603,300		751,600					751,600
SUBTOTAL		603,300		751,600					751,600
ELIZABETH AT MEEKER AVE		43,400					62,600		62,600
SUBTOTAL		43,400					62,600		62,600
SPRINGFIELD AT TENTH ST	9	35,650					48,800		48,800
SUBTOTAL		35,650					48,800		48,800
SPRINGFIELD AT BELMONT AV	10	27,950		34,600					34,600
SUBTOTAL		27,950		34,600					34,600
SO ORANGE AVE AT JONES ST	11	77,500		96,600					96,600
SUBTOTAL		77,500		96,600					96,600
WEST MARKET AT BERGEN ST	12	47,100						71,300	71,300
SUBTOTAL		47,100						71,300	71,300
CENTRAL AVE AT HIGH ST	13	31,200						47,200	47,200
SUBTOTAL		31,200						47,200	47,200
PARK AVE AT BRANCH BRK PK	14	160,500		200,000					200,000
SUBTOTAL		160,500		200,000					200,000
RAYMOND BLVD AT BROAD ST	15	69,200			90,500				90,500
SUBTOTAL		69,200			90,500				90,500

TABLE 6

NEWARK TOPICS COST SUMMARY

PROJECT	ID	1971 CONSTR. COST	R.O.W. COST	ESTIMATED CONSTRUCTION COST BY YEARS 1974	1975	1976	1977	1978	TOTAL COST
RAYMOND BLVD AT PINE ST	16	4,400			5,800				5,800
SUBTOTAL		4,400			5,800				5,800
MULBERRY ST AT PARK PLACE	17	22,100	5,000					33,500	38,500
SUBTOTAL		22,100	5,000					33,500	38,500
RAYMOND BLVD AT RAY PLZ E	18	22,250	4,000				32,100		36,100
SUBTOTAL		22,250	4,000				32,100		36,100
RAYMOND BLVD AT MARKET ST	19	40,750					58,800		58,800
RAYMOND BLVD REPAVING		25,000					36,100		36,100
SUBTOTAL		65,750					94,900		94,900
SOUTH ST AT DELANCY ST	20	66,500			87,000				87,000
SUBTOTAL		66,500			87,000				87,000
REVERSIBLE LANE PROJECTS									
BROAD STREET		159,700		199,000					199,000
MARKET STREET		85,600		106,600					106,600
SUBTOTAL		245,300		305,600					305,600
REVERSIBLE STREET PROJECT									
RAYMOND BLVD-WARREN ST		93,600			122,400				122,400
SUBTOTAL		93,600			122,400				122,400
SIG MOD AND COORDINATION									
CBD SIGNAL SYSTEM		541,600		674,700					674,700
FRELINGHUYSEN AVE SIGNALS		91,500						138,600	138,600
ELIZABETH AVENUE SIGNALS		79,100					114,100		114,100
CLINTON AVENUE SIGNALS		80,700				110,800			110,800
AVON AVENUE SIGNALS		50,800				69,800			69,800

TABLE 6

NEWARK TOPICS COST SUMMARY

PROJECT	ID	1971 CONSTR. COST	R.O.W. COST	ESTIMATED CONSTRUCTION COST BY YEARS					TOTAL COST
				1974	1975	1976	1977	1978	
SPRINGFIELD AVE SIGNALS		64,300					92,700		92,700
SOUTH ORANGE AVE SIGNALS		106,800				146,700			146,700
WEST MARKET ST SIGNALS		72,700					104,800		104,800
WARREN STREET SIGNALS		29,800			39,000				39,000
CENTRAL AVENUE SIGNALS		45,000					64,900		64,900
PARK AVENUE SIGNALS		42,900			56,100				56,100
BROADWAY SIGNALS		71,100			93,000				93,000
MCCARTER HIGHWAY SIGNALS		34,100			44,600				44,600
RAYMOND BOULEVARD SIGNALS		68,300						103,400	103,400
MARKET-FERRY SIGNALS		80,500						121,900	121,900
SUBTOTAL		1,459,200		674,700	232,700	327,300	376,500	363,900	1,975,100
STREET NAME SIGNS		68,900		85,800					85,800
SUBTOTAL		68,900		85,800					85,800
BUS STOP STUDY AND SIGNS		103,000						156,000	156,000
SUBTOTAL		103,000						156,000	156,000
TOW AWAY PROGRAM SIGNS		11,200		14,000					14,000
SUBTOTAL		11,200		14,000					14,000
TOTAL		3,935,950							
			42,000	2,303,600	686,500	651,300	795,800	812,000	5,291,200

IMPLEMENTATION SCHEDULE

Priorities for each of the corridor and spot improvement projects were developed based upon a rating system considering accident frequency and capacity conditions. Accident rating points were assigned according to the number of accidents occurring at each intersection. Intersections with fewer than 6 accidents per year over the three-year period (19697 to 1971) as recorded by the Newark Police Department received no accident rating points.

Capacity rating points were assigned based upon the magnitude of the overall ratio of approach volume to capacity calculated for all intersection approaches. 1975 traffic volumes and existing physical conditions were used to perform the capacity analyses, and intersections exhibiting no deficiency in 1975 received no capacity rating points.

A five-year plan for implementing intersection designs and system improvements is shown in Table 7. The plan was prepared using the rating system described above and taking into account certain adjustments to provide a logical orderly construction sequence and to account for other considerations not easily included in the priority input data.

The listing is in the recommended priority order with the early implementation program and certain other high priority projects which can be started quickly slated for construction during the first year.

TABLE 7

NEWARK TOPICS IMPLEMENTATION SCHEDULE

PROJECT	ID	1971 CONSTR. COST	R.O.W. COST	ESTIMATED CONSTRUCTION COST BY YEARS 1974	1975	1976	1977	1978	TOTAL COST
CBD SIGNAL SYSTEM		541,600		674,700					674,700
REVERSIBLE LANE PROJECTS									
BROAD STREET		159,700		199,000					199,000
MARKET STREET		65,600		106,600					106,600
SO ORANGE AVE AT JONES ST	11	77,500		96,600					96,600
SPRINGFIELD AT BELMONT AV	10	27,950		34,800					34,800
BROAD STREET CORRIDOR	6								
CENTRAL AVENUE	6A	23,150		28,800					28,800
CLAY STREET	6C	39,900		49,700					49,700
WASHINGTON STREET	6B	24,650		31,000					31,000
STREET NAME SIGNS		68,900		85,800					85,800
TOW AWAY PROGRAM SIGNS		11,200		14,000					14,000
BLOOMFIELD AVE CORRIDOR		603,300		751,600					751,600
PARK AVE AT BRANCH BRK PK	14	160,500		200,000					200,000
PARK AVENUE SIGNALS		42,900			56,100				56,100
BROADWAY SIGNALS		71,100			93,000				93,000
MCCARTER HIGHWAY CORRIDOR	7	5,600			7,300				7,300
LOMBARDY PLACE	7A	23,850			31,200				31,200
BRIDGE STREET	7B	25,800	9,000		33,800				42,800
CLAY STREET	7C	47,950	24,000		62,700				86,700
CLAY ST REPAVING		10,000			13,100				13,100
MCCARTER HIGHWAY SIGNALS		34,100			44,600				44,600
RAYMOND BLVD AT BROAD ST	15	69,200			90,500				90,500
REVERSIBLE STREET PROJECT									
RAYMOND BLVD-WARREN ST		93,600			122,400				122,400

TABLE 7

NEWARK TOPICS IMPLEMENTATION SCHEDULE

PROJECT	ID	1971 CONSTR. COST	R.O.W. COST	ESTIMATED CONSTRUCTION COST BY YEARS 1974	1975	1976	1977	1978	TOTAL COST
WARREN STREET SIGNALS		29,800			39,000				39,000
RAYMOND BLVD AT PINE ST	16	4,400			5,600				5,800
SOUTH ST AT DELANCY ST	20	66,500			87,000				87,000
SPRINGFLD-MARKET CORRIDOR	4A4B	83,050		31,000		79,900			110,900
SOUTH ORANGE AVE SIGNALS		106,800				146,700			146,700
CLINTON AVENUE CORRIDOR	2								
HAYES CIRCLE	2A2B	71,050				97,600			97,600
HIGH STREET	2C	23,850				32,800			32,800
WASHINGTON STREET	2D	40,650				55,600			55,800
BROAD ST AT LINCOLN PARK	2E	42,150				57,900			57,900
CLINTON AVENUE SIGNALS		80,700				110,800			110,800
AVON AVENUE SIGNALS		50,800				69,800			69,800
WASHINGTON-UNIV CORRIDOR	3	24,500					35,300		35,300
WASHINGTON AT W KINNEY ST	3A	28,900					41,700		41,700
WASHINGTON ST REPAVING		25,000					36,100		36,100
CENTRAL AVENUE CORRIDOR	5	7,000					10,100		10,100
CENTRAL AT WEST MARKET ST	5A	40,000					57,700		57,700
CENTRAL AVENUE SIGNALS		45,000					64,900		64,900
WEST MARKET ST SIGNALS		72,700					104,800		104,800
SPRINGFIELD AT TENTH ST	9	33,850					48,800		48,800
SPRINGFIELD AVE SIGNALS		64,300					92,700		92,700
ELIZABETH AT MEEKER AVE	8	43,400					62,600		62,600
ELIZABETH AVENUE SIGNALS		79,100					114,100		114,100
RAYMOND BLVD AT RAY PLZ E	18	22,250	4,000				32,100		36,100
RAYMOND BLVD AT MARKET ST	19	40,750					58,800		58,800

TABLE 7

NEWARK TOPICS IMPLEMENTATION SCHEDULE

PROJECT	ID	1971 CONSTR. COST	R.O.W. COST	ESTIMATED CONSTRUCTION COST BY YEARS 1974	1975	1976	1977	1978	TOTAL COST
RAYMOND BLVD REPAVING		25,000					36,100		36,100
MARKET-FERRY SIGNALS		80,500						121,900	121,900
RAYMOND BOULEVARD SIGNALS		60,300						103,400	103,400
CENTRAL AVE AT HIGH ST	13	31,200						47,200	47,200
MULBERRY ST AT PARK PLACE	17	22,100	5,000					33,500	38,500
FRELINGHUYSEN AV CORRIDOR	1	92,500						140,100	140,100
FRELINGHUYSEN AVE SIGNALS		91,500						138,600	138,600
WEST MARKET AT BERGEN ST	12	47,100						71,300	71,300
BUS STOP STUDY AND SIGNS		103,000						156,000	156,000
TOTAL		3,935,950							
			42,000	2,303,600	686,500	651,300	795,800	812,000	5,291,200

APPENDIX A

NEWARK TOPICS NETWORK KEY

Existing Conditions

FEDERAL-AID DESIGNATION

1	Existing Urban System
2	Existing Primary Type I
3	Existing Secondary
4	Proposed Primary Type II

PAVEMENT TYPE

A	Asphalt
C	Concrete
B	Brick

SURFACE CONDITION

G	Good
F	Fair
P	Poor

PARKING REGULATIONS

1	No Stopping Any Time
2	No Stopping 4-6 P.M.
3	No Stopping 7-9 A.M.
4	No Parking Any Time
5	No Parking 7-9 A.M.
6	No Parking 4-6 P.M.
7	No Parking 7-9 A.M. and No Stopping 4-6 P.M.
8	No Parking 4-6 P.M. and No Stopping 7-9 A.M.

PARKING REGULATIONS (continued)

9	No Stopping 7-9 A.M. and No Stopping 4-6 P.M.
10	No Parking Any Time and No Stopping 4-6 P.M.
11	No Parking 7-9 A.M. and No Parking 4-6 P.M.
12	No Stopping or Parking 4-6 P.M.
13	No Stopping 7-9 A.M. and No Parking Any Time
14	No Parking Restrictions Posted
15	No Parking Any Time and No Stopping 7-9 A.M., 4-6 P.M.
16	Metered Parking or 1 Hr. Parking Only Regulation
17	No Parking Any Time and No Stopping 7-9 A.M.

NOTE: 1) In some locations the 7-9 A.M. restriction may actually apply 7-9:30 A.M.
2) Left and right (L and R) regulations refer to the side of the street when traveling in the direction indicated by the Location listing.

DISTANCE

In miles, to the nearest tenth.

DIRECTION

2way = two-way traffic
1way = one-way traffic (direction is that indicated by the Location listing)

LANES

Table shows number of travel lanes in direction of travel on link during PEAK and OFF-PEAK hours. Where operation is not symmetrical by direction, two listings for the street are shown.

CAPACITY

Capacity ratings are based on 1975 volumes at critical intersections with signal phasing balanced to provide Level of Service C on all approaches under existing conditions during peak hours.

NEWARK TOPICS NETWORK SUMMARY

			DI-			ONE DIR	WIDTH		PAVEMENT		LANES 1-DIR		PARK REG.		LEV C
STREET NAME	LOCATION	DIST (MI)	REC-TION	FED AID	1975 AWDT	1975 PEAK HR	ROAD	R/W	TYP	CD	PK	OFF	L	R	CAP
ACADEMY STREET	BROAD ST TO HALSEY ST	0.1	1WAY	4	2,500	350 PM	20	38	A	F	2	1	4	15	400
	HALSEY ST TO WASHINGTON	0.1	1WAY	4	2,500	350 PM	25	38	A	F	2	1	4	15	400
	WASHINGTON TO UNIVERSITY	0.1	1WAY	4	2,500	350 PM	25	45	A	F	2	2	4	4	400
AVON AVENUE	SOUTH 20TH ST TO CLINTON	1.5	2WAY	4	10,500	500 PM	48	80	A	F	2	1	2	3	900
BANK STREET	UNIVERSITY TO WASHINGTON	0.1	1WAY	4	2,500	300 AM	22	45	A	F	2	2	4	4	450
	WASHINGTON TO HALSEY ST	0.1	1WAY	4	2,500	300 AM	20	40	A	F	2	2	4	4	450
	HALSEY ST TO BROAD ST	0.1	1WAY	4	2,500	300 AM	25	47	A	F	2	2	4	9	450
BELMONT AVE	CLINTON AVE TO SPRUCE AVE	0.5	2WAY	1	10,000	300 PM	58	100	A	G	2	2	14	14	650
	SPRUCE AVE TO W.KINNEY ST	0.2	2WAY	1	14,000	500 PM	58	100	A	G	2	2	14	14	600
	W.KINNEY TO SPRINGFIELD	0.2	2WAY	1	18,000	700 PM	58	100	A	G	2	2	14	14	500
BLEEKER STREET	HIGH ST TO WASHINGTON ST	0.2	2WAY	4	7,000	800 PM	30	60	A	F	1	1	14	14	950
	WASHINGTON ST TO HALSEY	0.1	2WAY	4	3,500	400 PM	30	60	A	F	1	1	4	4	550
BRANFORD PLACE	SPRINGFIELD TO WASHINGTON	0.2	1WAY	4	4,000	650 AM	40	62	A	F	2	2	14	14	750
	WASHINGTON TO BROAD ST	0.2	1WAY	4	6,000	700 AM	40	58	A	F	2	2	14	14	800
BRIDGE STREET	BROAD ST TO CITY LINE	0.3	2WAY	1	13,000	800 PM	40	66	A	F	1	1	15	15	650
BROAD STREET	POINIER TO LINCOLN PARK	0.6	2WAY	1	25,000	1,400 PM	64	100	A	F	3	2	7	8	1,400
	LINCOLN PARK TO WALNUT	0.4	2WAY	1	39,000	2,000 PM	92	132	A	F	4	3	7	8	1,900
	WALNUT TO RAYMOND BLVD	0.5	2WAY	1	32,000	1,600 PM	92	132	A	F	4	3	7	8	1,800
	RAYMOND BLVD TO CENTRAL	0.3	2WAY	1	25,000	1,400 PM	82	132	A	F	3	3	10	10	1,000
	CENTRAL TO WASHINGTON	0.2	2WAY	1	41,000	2,100 AM	90	132	A	F	5	4	10	7	2,000
	WASHINGTON TO LACKAWANNA	0.1	2WAY	1	41,000	2,500 PM	72	99	A	F	4	3	7	7	1,600
	LACKAWANNA TO CLAY	0.2	2WAY	1	41,000	2,400 PM	64	99	A	F	4	2	10	7	2,300
	CLAY TO BLOOMFIELD PLACE	0.2	1WAY	4	21,000	2,200 PM	36	60	A	P	3	2	7	10	2,300
	BLOOMFIELD PL TO HARVEY	0.6	1WAY		6,000	800 PM	36	60	A	P	2	2	16	4	1,000
BROADWAY	CITY LINE TO E.4TH AVE	2.0	2WAY	1	13,000	900 PM	58	100	A	F	2	2	3	2	1,200
	E.4TH AVE TO BLOOMFIELD	0.2	2WAY	1	13,000	900 PM	52	66	A	F	2	2	3	2	1,200
	BLOOMFIELD TO BROAD ST	0.3	1WAY	1	13,500	950 PM	44	66	A	F	4	2	5	5	900

NEWARK TOPICS NETWORK SUMMARY

STREET NAME	LOCATION	DIST (MI)	DI-REC-TION	FED AID	1975 AWDT	ONE DIR 1975 PEAK HR	WIDTH ROAD	WIDTH R/W	PAVEMENT TYP	PAVEMENT CD	LANES 1-DIR PK	LANES 1-DIR OFF	PARK REG. L	PARK REG. R	LEV C CAP
CAMP STREET	BROAD ST TO MULBERRY ST	0.2	1WAY	4	700	50 PM	30	50	A	F	2	1	4	14	100
CEDAR STREET	BROAD ST TO HALSEY ST	0.1	1WAY	4	700	50 PM	25	44	A	F	2	1	4	15	600
CENTRAL AVENUE	SO.16TH ST TO WEST MARKET	0.5	2WAY	1	32,000	1,900 AM	56	100	A	F	3	2	12	3	1,500
	WEST MARKET ST TO HIGH ST	1.0	2WAY	1	20,000	900 PM	45	80	A	F	2	1	7	3	1,300
	HIGH ST TO BROAD ST	0.4	2WAY	1	19,000	1,000 PM	40	80	A	F	2	1	10	13	1,000
CENTRE STREET	MULBERRY ST TO MCCARTER	0.1	2WAY	1	14,000	600 PM	40	66	A	F	1	1	4	4	550
CHESTNUT STREET	MCCARTER HWY TO MULBERRY	0.1	1WAY	4	5,000	810 PM	30	44	B	P	2	1	15	15	750
	MULBERRY ST TO BROAD ST	0.2	1WAY	4	5,000	810 PM	24	44	A	P	2	1	9	15	750
CLAY STREET	BROAD ST TO MCCARTER HWY	0.1	2WAY	4	12,500	700 PM	50	74	B	F	2	1	9	9	650
	MCCARTER HWY TO CTY.LINE	0.2	2WAY	4	15,500	1,200 PM	35	60	A	P	1	1	4	14	800
CLINTON AVENUE	SO.20TH ST TO W.ALPINE ST	1.2	2WAY	1	22,000	1,500 PM	48	80	A	F	2	1	7	3	1,800
	W.ALPINE ST TO ELIZABETH	0.5	2WAY	1	18,000	700 PM	52	80	A	F	2	1	7	3	1,200
	ELIZABETH AVE TO HIGH ST	0.2	2WAY	1	29,000	1,800 AM	75	132	A	F	3	2	7	3	2,000
	HIGH ST TO LINCOLN PARK	0.2	2WAY	1	23,000	1,700 PM	75	132	A	F	3	2	7	3	1,100
COMMERCE COURT	RAYMOND BLVD TO COMMERCE	0.1	1WAY	4	1,400	100 PM	30	55	A	F	2	1	2	15	200
COMMERCE STREET	MCCARTER HWY TO MULBERRY	0.1	1WAY	4	3,000	600 PM	36	60	B	P	3	2	4	11	700
	MULBERRY ST TO BROAD ST	0.2	1WAY	4	3,000	600 PM	36	60	A	P	3	2	11	10	700
COURT STREET	HIGH ST TO UNIVERSITY AVE	0.1	2WAY	4	5,000	700 PM	74	115	A	F	2	2	16	16	1,200
	UNIVERSITY TO WASHINGTON	0.1	2WAY	4	4,000	600 PM	62	100	A	F	2	2	16	16	1,100
	WASHINGTON TO BROAD ST.	0.1	2WAY	4	7,000	900 PM	62	80	A	G	2	2	16	16	1,600
CRAWFORD STREET	HIGH ST TO WASHINGTON ST	0.1	2WAY	4	1,000	100 PM	30	50	B	P	1	1	14	14	350
	WASHINGTON ST TO HALSEY	0.1	2WAY	4	700	50 PM	30	50	B	P	1	1	16	4	200
	HALSEY ST TO LINCOLN PARK	0.1	1WAY	4	700	50 PM	33	50	A	F	2	2	4	14	200
EDISON PLACE	BROAD ST TO MULBERRY ST	0.2	1WAY	4	6,500	600 AM	20	33	A	F	1	1	4	4	750

NEWARK TOPICS NETWORK SUMMARY

STREET NAME	LOCATION	DIST (MI)	DIREC- TION	FED AID	1975 AWDT	ONE DIR 1975 PEAK HR	WIDTH ROAD	WIDTH R/W	PAVEMENT TYP	PAVEMENT CD	LANES 1-DIR PK	LANES 1-DIR OFF	PARK REG. L	PARK REG. R	LLV C CAP
EDISON PLACE	MULBERRY ST TO LAWRENCE	0.1	1WAY	4	6,500	600 AM	20	70	B	P	1	1	4	4	750
	LAWRENCE ST TO FERRY ST	0.2	1WAY	4	6,500	600 AM	30	70	B	P	2	2	14	4	750
ELIZABETH AVE	CITY LINE TO MEEKER AVE	1.0	2WAY	1	19,000	1,400 PM	52	80	A	F	2	1	14	14	1,300
	MEEKER AVE TO W.PEDDIE ST	0.4	2WAY	1	24,000	1,200 AM	52	80	A	P	2	1	2	3	1,300
	W.PEDDIE ST TO CLINTON AV	0.8	2WAY	1	24,000	1,100 AM	56	100	A	F	3	2	2	3	900
ELM STREET	MCCARTER HWY TO MULBERRY	0.1	1WAY	4	1,000	100 AM	30	50	A	P	1	1	14	14	200
E.PARK STREET	PARK PL. TO NEW MULBERRY	0.1	1WAY	4	2,000	250 PM	28	45	A	F	2	1	9	4	350
FERRY STREET	N.J.RR AVE TO EDISON PL	0.1	2WAY	1	10,000	300 PM	55	94	A	G	2	1	7	3	450
	EDISON PL TO JACKSON ST	0.5	2WAY	1	12,000	500 PM	40	66	A	G	2	1	7	3	800
	JACKSON ST TO MERCHANT ST	0.1	2WAY	1	9,000	400 PM	40	66	A	G	2	1	7	3	450
	MERCHANT ST TO MARKET ST	0.5	2WAY	1	9,000	400 PM	46	66	A	G	2	1	7	3	450
	MARKET ST TO RAYMOND BLVD	1.0	1WAY	1	18,000	1,200 PM	46	66	A	F	3	2	4	14	1,300
FOURTH STREET	MARKET TO ESSEX CTY LINE	0.2	2WAY	1	13,000	850 PM	38	50	A	F	1	1	4	4	850
FRANKLIN STREET	MULBERRY ST TO BROAD ST	0.2	1WAY	4	1,000	100 AM	35	48	A	P	1	1	14	4	200
FRELINGHUYSEN	VIRGINIA ST TO MCCLELLAN	0.1	2WAY	1	17,000	1,100 AM	70	100	A	P	2	2	14	14	1,200
	MCCLELLAN TO DAYTON ST	0.8	2WAY	1	17,000	800 PM	70	100	A	P	2	2	14	14	1,300
	DAYTON ST TO HAYNES AVE	0.1	2WAY	1	19,000	1,000 PM	70	100	A	P	2	2	14	14	1,700
	HAYNES AVE TO E.ALPINE ST	1.2	2WAY	1	21,000	1,100 PM	70	100	A	P	2	2	14	14	1,200
	E.ALPINE ST TO POINIER ST	0.1	2WAY	1	21,000	1,100 PM	52	75	A	P	2	2	14	4	1,200
FULTON STREET	BROAD ST TO MCCARTER HWY	0.1	1WAY	4	2,000	200 AM	40	66	A	G	2	2	16	16	400
GREEN STREET	BROAD ST TO MULBERRY ST	0.2	1WAY	4	2,000	150 PM	40	64	A	F	2	2	16	16	250
	MULBERRY ST TO MCCARTER	0.1	1WAY	4	1,000	100 PM	30	50	A	F	1	1	14	16	200
HALSEY STREET	WASH.PL. TO RAYMOND BLVD	0.4	1WAY	4	7,000	650 AM	32	54	A	F	3	2	4	15	800
	RAYMOND BLVD TO MARKET ST	0.1	1WAY	4	6,000	600 AM	32	54	A	F	3	2	4	15	750
	MARKET ST TO WILLIAM ST	0.2	1WAY	4	5,000	450 PM	32	45	A	P	3	2	4	15	600

NEWARK TOPICS NETWORK SUMMARY

STREET NAME	LOCATION	DIST (MI)	DIRECTION	FED AID	1975 AWDT	ONE DIR 1975 PEAK HR	WIDTH ROAD	WIDTH R/W	PAVEMENT TYP	PAVEMENT CD	LANES 1-DIR PK	LANES 1-DIR OFF	PARK REG. L	PARK REG. R	LEV C CAP
HALSEY STREET	WILLIAM ST TO HILL ST	0.1	1WAY	4	5,000	450 PM	32	60	A	P	3	2	4	15	600
HARVEY STREET	BROAD ST TO BROADWAY	0.1	2WAY		4,500	300 PM	36	60	A	F	1	1	14	14	350
HIGH STREET	CLINTON AVE TO MERCER ST	0.7	2WAY	1	12,000	700 AM	50	66	A	F	2	1	14	14	700
	MERCER ST TO SPRINGFIELD	0.2	2WAY	1	12,000	700 AM	40	66	A	F	1	1	14	14	700
	SPRINGFIELD TO MARKET ST	0.1	2WAY	1	10,000	600 AM	50	66	A	F	2	2	4	4	550
	MARKET ST TO WARREN ST	0.2	2WAY	1	11,000	500 PM	40	66	A	P	1	1	14	14	450
	WARREN ST TO NEW ST	0.1	2WAY	1	11,000	600 PM	40	66	A	F	1	1	4	14	550
	NEW ST TO ORANGE ST	0.4	2WAY	1	11,000	600 PM	40	66	A	F	1	1	14	14	550
HILL STREET	WASHINGTON ST TO HALSEY	0.1	2WAY	4	3,000	200 PM	40	66	A	F	1	1	16	4	300
	HALSEY ST TO BROAD ST	0.1	2WAY	4	6,000	400 PM	40	66	A	F	1	1	16	4	600
JAMES STREET	WASHINGTON TO BURNETT ST	0.3	1WAY	4	3,500	400 PM	30	48	A	F	2	2	4	16	550
	BURNETT ST TO HIGH ST	0.1	2WAY	4	3,500	400 PM	30	48	A	F	1	1	15	10	550
JONES STREET	SPRINGFIELD TO SO.ORANGE	0.2	2WAY	1	20,000	800 PM	54	64	A	F	2	2	14	14	750
KINNEY STREET	HIGH ST TO WASHINGTON ST	0.2	2WAY	4	7,000	300 AM	36	60	A	P	1	1	14	14	600
	WASHINGTON TO NEVADA ST	0.1	2WAY	4	10,000	450 AM	47	60	A	F	2	1	7	3	1,000
	NEVADA ST TO BROAD ST	0.1	2WAY	4	10,000	450 AM	34	57	A	F	1	1	4	14	1,000
	BROAD ST TO MCCARTER HWY	0.3	2WAY	4	7,000	300 PM	33	57	A	P	1	1	4	14	600
LAFAYETTE ST	MCCARTER HWY TO LIBERTY	0.1	2WAY	1	6,000	400 PM	53	100	A	F	1	1	14	14	450
	LIBERTY ST TO COLUMBIA ST	0.1	2WAY	1	6,000	400 PM	40	75	A	F	1	1	14	14	450
	COLUMBIA ST TO MULBERRY	0.1	2WAY	1	6,000	400 PM	32	50	A	F	1	1	4	4	450
	MULBERRY ST TO BROAD ST	0.2	1WAY	1	7,000	450 PM	40	60	A	F	2	2	14	4	500
LINCOLN PARK	BROAD ST TO CLINTON AVE	0.2	1WAY	1	11,000	1,200 PM	75	132	A	F	4	3	3	2	750
LINCOLN PARK	CLINTON AVE TO BROAD ST	0.1	1WAY	4	6,000	700 PM	44	60	A	F	3	2	2	3	900
LOMBARDY STREET	BROAD ST TO MCCARTER HWY	0.1	2WAY	4	4,000	350 AM	38	66	A	F	1	1	14	11	350
LOMBARDY PLACE	MCCARTER TO LOMBARDY ST	0.1	1WAY	4	3,000	300 AM	38	66	A	F	3	3	4	4	3,500

NEWARK TOPICS NETWORK SUMMARY

STREET NAME	LOCATION	DIST (MI)	DI-REC-TION	FED AID	1975 AWDT	ONE DIR 1975 PEAK	HR	WIDTH ROAD	R/W	PAVEMENT TYP	CD	LANES 1-DIR PK	OFF	PARK REG. L	R	LEV C CAP
MARKET STREET	ORANGE ST TO SUSSEX AVE	0.3	2WAY	1	13,000	850	AM	40	66	A	F	1	1	14	14	1,200
	SUSSEX AVE TO 9TH.AVE	0.1	2WAY	1	11,500	650	PM	40	66	A	F	1	1	2	3	800
	9TH.AVE TO CENTRAL AVE	0.2	2WAY	1	11,500	1,100	AM	46	66	A	P	2	1	2	3	850
	CENTRAL AVE TO LITTLETON	0.1	2WAY	1	24,000	1,300	PM	65	86	A	F	3	2	2	3	1,600
	LITTLETON TO BERGEN ST	0.2	2WAY	1	24,000	1,300	PM	46	66	A	F	2	1	2	3	1,600
	BERGEN ST TO WARREN ST	0.1	2WAY	1	24,000	1,400	PM	68	90	A	G	3	2	2	3	1,800
	WARREN ST TO HUDSON ST	0.1	2WAY	1	16,500	1,100	PM	46	66	A	P	2	1	2	3	1,400
	HUDSON ST TO WICKLIFFE ST	0.4	2WAY	1	16,500	1,100	PM	54	80	A	F	2	1	2	3	1,400
	WICKLIFFE ST TO HIGH ST	0.2	2WAY	1	16,500	1,100	PM	54	87	A	F	2	1	2	3	1,400
	HIGH ST TO SPRINGFIELD AV	0.1	2WAY	4	10,000	500	PM	56	99	A	G	2	2	9	9	700
	SPRINGFIELD TO UNIVERSITY	0.1	2WAY	1	30,000	1,500	AM	100	140	A	F	4	3	4	3	1,800
	UNIVERSITY TO WASHINGTON	0.1	2WAY	1	30,000	1,500	AM	70	110	A	F	3	2	9	9	1,000
	WASHINGTON TO HALSEY ST	0.1	2WAY	1	22,000	1,000	AM	60	99	A	F	3	2	9	9	700
	HALSEY ST TO BROAD ST	0.1	2WAY	1	17,500	900	AM	60	99	A	F	3	2	9	9	1,100
	BROAD ST TO MULBERRY ST	0.1	2WAY	1	19,000	800	AM	62	99	A	F	3	2	7	9	1,200
	MULBERRY ST TO MCCARTER	0.1	2WAY	1	19,000	800	AM	50	90	A	F	2	1	7	9	850
	MCCARTER HWY TO FERRY ST	0.1	2WAY	1	16,500	900	AM	50	90	A	F	2	1	7	9	1,300
	FERRY ST TO RAYMOND BLVD	0.1	2WAY	1	8,000	500	PM	40	66	A	F	1	1	14	14	500
	RAYMOND BLVD TO JACKSON	0.3	1WAY	1	16,000	1,700	PM	40	66	A	F	3	2	9	4	1,650
	JACKSON ST TO FERRY ST	0.5	1WAY	4	16,000	1,400	PM	40	86	A	F	2	2	14	14	1,350
MCCARTER HWY	ROUTES 1&9 TO POINIER ST	0.7	2WAY	1	35,000	2,000	AM	54	75	A	F	2	2	1	1	3,000
	POINIER ST TO MILLER ST	0.1	2WAY	1	35,000	2,000	AM	87	100	A	F	3	3	15	15	3,000
	MILLER ST TO WRIGHT ST	0.1	2WAY	1	32,000	1,200	AM	87	100	A	F	3	3	15	15	1,700
	WRIGHT ST TO MURRAY ST	0.2	2WAY	1	32,000	1,200	AM	56	72	A	F	2	2	15	15	1,700
	MURRAY ST TO SOUTH ST	0.2	2WAY	1	32,000	1,200	AM	56	95	A	F	2	2	15	15	1,700
	SOUTH ST TO MULBERRY ST	0.2	2WAY	1	36,000	1,300	AM	56	72	A	F	2	2	15	15	1,800
	MULBERRY ST TO WALNUT ST	0.4	2WAY	1	34,000	1,300	AM	56	72	A	F	2	2	15	15	1,800
	WALNUT ST TO LAFAYETTE ST	0.2	2WAY	1	32,500	1,300	AM	56	72	A	F	2	2	15	15	1,800
	LAFAYETTE TO COMMERCE	0.3	2WAY	1	32,500	1,200	PM	66	90	A	G	3	3	15	15	1,300
	COMMERCE TO CENTRE ST	0.3	2WAY	1	32,500	1,200	PM	76	90	A	G	3	3	15	15	1,200
	CENTRE ST TO BRIDGE ST	0.4	2WAY	1	36,000	1,750	PM	56	80	A	F	2	2	15	15	1,400
	BRIDGE ST TO DIVISION ST	0.1	2WAY	1	37,000	1,800	PM	56	80	A	F	2	2	15	15	1,100
	DIVISION ST TO STICKLE BR	0.1	2WAY	1	37,000	1,900	PM	50	60	A	F	2	2	15	15	1,200
	STICKLE BR TO CLAY ST	0.1	2WAY	2	37,000	1,900	PM	56	80	A	F	2	2	15	15	1,200

NEWARK TOPICS NETWORK SUMMARY

STREET NAME	LOCATION	DIST (MI)	DIRECTION	FED AID	1975 AWDT	ONE DIR 1975 PEAK HR	WIDTH ROAD	WIDTH R/W	PAVEMENT TYP	PAVEMENT CD	LANES 1-DIR PK	LANES 1-DIR OFF	PARK REG. L	PARK REG. R	LEV C CAP
MCCARTER HWY	CLAY ST TO CLARK ST	0.2	2WAY	2	34,000	1,700 PM	60	84	A	F	2	1	9	9	1,200
	CLARK ST TO ORIENTAL PL	0.5	2WAY	2	34,000	1,500 PM	60	84	A	F	2	2	15	15	1,300
	ORIENTAL PL TO CITY LINE	1.7	2WAY	2	34,000	1,500 PM	96	100	A	G	3	3	14	14	2,200
MEEKER AVENUE	FRELINGHUYSEN TO NOBLE ST	0.2	2WAY		18,500	1,000 PM	35	66	A	G	1	1	15	4	900
	NOBLE ST TO FRELINGHUYSEN	0.2	2WAY		18,500	400 PM	35	66	A	G	2	2	4	15	350
	NOBLE ST TO ELIZABETH AVE	0.3	2WAY		18,500	800 PM	35	66	A	F	2	2	15	4	700
	ELIZABETH AVE TO NOBLE ST	0.3	2WAY		18,500	800 PM	35	66	A	F	1	1	4	15	700
MULBERRY STREET	SAYBROOK PL TO E.PARK ST	0.1	2WAY	1	12,000	800 PM	64	88	A	G	3	2	4	4	750
	E.PARK ST TO RAYMOND BLVD	0.1	2WAY	1	12,000	800 PM	85	120	A	G	3	2	4	4	750
	RAYMOND BLVD TO MARKET ST	0.1	1WAY	1	10,000	750 PM	85	101	A	F	3	3	5	5	1,200
	MARKET ST TO EDISON PL	0.1	1WAY	1	10,000	600 PM	50	66	B	P	3	2	11	11	1,000
	EDISON PL TO MCCARTER HWY	0.7	1WAY	1	10,000	600 PM	50	66	B	P	3	2	11	11	1,000
NEW STREET	BROAD ST TO WASHINGTON ST	0.2	1WAY	4	2,000	200 PM	25	50	A	F	1	1	4	16	400
	WASHINGTON TO UNIVERSITY	0.1	2WAY	4	2,000	200 PM	30	50	A	F	1	1	4	4	400
NORFOLK STREET	SO.ORANGE ST TO W.MARKET	0.3	2WAY	1	15,000	500 PM	40	60	A	F	1	1	14	14	650
	W.MARKET TO CENTRAL AVE	0.4	2WAY	1	10,000	450 PM	40	60	A	F	1	1	14	14	600
ORANGE STREET	CITY LINE TO ROSEVILLE AV	0.4	2WAY	1	10,000	1,000 PM	40	66	A	F	2	1	2	3	900
	ROSEVILLE AVE TO FIRST ST	0.4	2WAY	1	14,000	1,000 PM	40	66	A	F	2	1	2	3	900
	FIRST ST TO HECKER ST	0.2	2WAY	1	14,000	600 AM	40	66	A	P	2	1	10	17	400
	HECKER ST TO CLIFTON AVE	0.1	2WAY	1	14,000	600 AM	40	66	A	F	2	1	2	3	400
	CLIFTON AVE TO BOYDEN ST	0.3	2WAY	1	14,000	600 AM	50	73	A	G	2	2	2	3	400
	BOYDEN ST TO HIGH ST	0.2	2WAY	1	14,000	600 AM	40	66	A	F	2	1	2	3	400
	HIGH ST TO BROAD ST	0.3	2WAY	1	14,000	600 AM	40	66	A	F	2	1	7	17	400
	BROAD ST TO MCCARTER HWY	0.1	1WAY	4	2,000	150 AM	28	47	A	F	1	1	4	14	100
ORCHARD STREET	SOUTH ST TO CAMP ST	0.1	2WAY	4	1,600	50 PM	35	60	A	F	1	1	4	14	200
	CAMP ST TO E.KINNEY ST	0.1	1WAY	4	1,600	100 PM	30	40	A	F	1	1	4	14	350
	E.KINNEY ST TO WALNUT ST	0.1	2WAY	4	1,600	50 PM	30	40	A	F	1	1	4	4	200
PARK AVENUE	CITY LINE TO NO.6TH ST	0.4	2WAY	1	24,000	1,300 AM	60	100	A	G	2	2	2	3	1,400

N E W A R K   T O P I C S   N E T W O R K   S U M M A R Y

STREET NAME	LOCATION	DIST (MI)	DI-REC-TION	FED AID	1975 AWDT	ONE DIR 1975 PEAK	HR	WIDTH ROAD	WIDTH R/W	PAVEMENT TYP	PAVEMENT CD	LANES 1-DIR PK	LANES 1-DIR OFF	PARK REG. L	PARK REG. R	LLV C CAP
PARK AVENUE	NO.6TH ST TO BRANCH BROOK	0.1	2WAY	1	30,000	1,300	AM	60	100	A	G	2	2	2	3	1,400
	BRANCH BROOK DR. TO LAKE	0.2	2WAY	1	23,000	1,000	AM	40	100	A	G	2	2	1	1	1,400
	LAKE ST TO CLIFTON AVE	0.2	2WAY	1	23,000	1,200	AM	60	100	A	G	2	2	2	3	1,400
	CLIFTON AVE TO STONE ST	0.2	2WAY	1	17,000	900	AM	60	100	A	G	2	2	2	3	1,400
	STONE ST TO BLOOMFIELD AV	0.1	2WAY	1	17,000	900	AM	50	100	A	G	2	2	2	3	1,400
PARK PLACE	BROAD ST TO CENTRE ST	0.2	1WAY	4	6,000	600	PM	42	66	A	F	4	3	4	4	500
PARK PLACE	SAYBROOK PL TO BROAD ST	0.1	2WAY	1	23,000	1,400	PM	60	80	A	G	4	4	4	4	1,000
	BROAD ST TO SAYBROOK PL	0.1	2WAY	1	23,000	1,100	PM	60	80	A	G	2	2	4	4	950
PENNINGTON ST	BROAD ST TO MCCARTER HWY	0.2	1WAY	4	2,000	150	PM	32	55	A	P	2	1	14	4	200
PINE STREET	E.PARK ST TO RAYMOND BLVD	0.1	1WAY	4	2,500	175	PM	30	50	A	F	2	2	4	4	350
POINIER STREET	FRELINGHUYSEN TO BROAD ST	0.2	2WAY	1	11,000	750	PM	56	90	A	F	2	2	4	4	750
RAYMOND BLVD	ROUTES 1&9 TO FERRY ST	0.2	2WAY	1	18,000	1,450	AM	60	100	A	P	3	3	4	4	1,500
	FERRY ST TO MARKET ST	1.5	1WAY	1	18,000	1,450	AM	40	66	A	P	3	3	4	4	1,500
	MARKET TO RAYMOND PLAZA E	0.1	2WAY	1	28,000	1,900	PM	48	66	A	P	2	2	4	4	1,400
	RAYMOND PLA E TO RIVER ST	0.1	2WAY	1	32,000	2,100	PM	60	100	A	F	2	2	4	4	2,100
	RIVER ST TO MCCARTER	0.1	2WAY	1	28,000	1,400	PM	70	110	A	F	3	2	4	9	1,400
	MCCARTER HWY TO BROAD ST	0.3	2WAY	1	17,500	1,600	PM	52	86	A	F	2	2	15	4	1,400
	BROAD ST TO UNIVERSITY AV	0.3	2WAY	1	12,000	1,300	AM	40	60	A	F	4	2	15	15	1,800
	UNIVERSITY AVE TO LOCK ST	0.4	2WAY	1	12,000	1,200	AM	50	60	A	F	4	2	15	15	1,800
RAYMOND PLAZA W	MARKET ST TO RIVER ST	0.1	1WAY	4	4,500	300	AM	82	125	A	F	4	4	4	4	450
RECTOR STREET	MCCARTER HWY TO PARK PL	0.1	2WAY	4	4,000	250	PM	30	50	A	F	1	1	4	4	300
	PARK PL. TO BROAD ST	0.1	1WAY	4	4,000	250	PM	40	50	A	F	3	3	4	4	300
RIVER STREET	RAYMOND PLAZA W. TO MCCAR	0.2	1WAY	4	10,500	750	PM	52	66	B	P	3	3	4	4	800
SAYBROOK PLACE	PARK PL. TO MCCARTER HWY	0.1	1WAY	4	2,000	150	AM	35	60	A	F	2	2	16	16	250
SO. ORANGE AVE	CITY LINE TO MAYBAUM AVE	1.2	2WAY	1	21,000	1,000	AM	50	80	A	G	2	1	2	3	900

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                         N E W A R K   T O P I C S   N E T W O R K   S U M M A R Y

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                                                      DI-                    ONE DIR                                   LANES PARK
                                                DIST REC- FED   1975          1975     WIDTH PAVEMENT 1-DIR REG. LEV C
    STREET NAME              LOCATION           (MI) TION AID   AWDT        PEAK HR  ROAD R/W TYP CO PK OFF L   R   CAP
    ------ ----              --------           ---- ---- ---   ----        -------  ---- --- --- -- -- --- -   - -----
SO. ORANGE AVE  MAYBAUM AVE TO SPEEDWAY          0.1 2WAY  1   21,000     900 AM    50   60  A   G  2   2  4   4   800
                SPEEDWAY AVE TO GROVE ST         0.1 2WAY  1   21,000   1,300 AM    50   60  A   G  2   1  9   9 1,500
                GROVE ST TO BERGEN ST            1.0 2WAY  1   21,000   1,400 PM    48   60  A   G  2   1  2   3 1,900
                BERGEN ST TO NORFOLK ST          0.3 2WAY  1   17,000   1,100 AM    36   66  A   G  2   1  2   3 1,000
                NORFOLK ST TO SPRINGFIELD        0.3 2WAY  1   14,000     800 AM    36   66  A   G  2   1  2   3   800

SOUTH STREET    BROAD ST TO MCCARTER HWY         0.2 2WAY  1    7,500     350 PM    40   66  A   F  1   1 14  14   500
                MCCARTER HWY TO PACIFIC          0.4 2WAY  1   11,000     600 PM    40   66  A   F  1   1 14  14   500
                PACIFIC ST TO PULASKI ST         0.5 2WAY  1   13,000     800 PM    40   66  A   F  1   1 14  14   500
                PULASKI ST TO DELANCY ST         0.5 2WAY  1   13,000     800 PM    40   66  C   F  1   1 14  14   500

SPRINGFIELD AVE CITY LINE TO SO.10TH ST          0.6 2WAY  1   24,000   1,200 PM    50   85  A   F  2   1  7   3 1,400
                SO.10TH ST TO 16TH AVE           0.6 2WAY  1   20,000   1,200 PM    50   85  A   F  2   1  7   3 1,600
                16TH AVE TO JONES ST             0.3 2WAY  1   20,000   1,100 PM    40   66  A   F  2   1  7   3   800
                JONES ST TO SO.ORANGE AVE        0.4 2WAY  1   14,000     800 AM    40   66  A   G  2   1  7   3   750
                SO.ORANGE AVE TO MARKET          0.2 2WAY  1   21,000   1,500 AM    50   66  A   G  3   2  7   3 1,400

SPRUCE STREET   HIGH ST TO WASHINGTON ST         0.2 2WAY  1    3,500     300 PM    38   66  A   F  1   1 14  14   700
                WASHINGTON TO LINCOLN PK.        0.1 1WAY  1    3,500     300 PM    38   66  A   F  2   2 16  16   700

STICKLE BRIDGE  MCCARTER TO ESSEX CTY LIN        0.1 2WAY  2   23,500   2,500 AM    72  100  C   F  3   3  1   1 3,000

TICHENOR STREET MC CARTER HWY TO BROAD ST        0.2 1WAY  4    1,500     100 PM    33   55  A   P  1   1 14  14   150

UNIVERSITY AVE  BROAD ST TO CENTRAL AVE          0.4 1WAY  4   10,000     450 PM    30   50  B   P  2   1  9   9   450
                CENTRAL AVE TO RAYMOND BL        0.4 1WAY  4   10,000     700 AM    35   60  B   P  3   2  5  15   650
                RAYMOND BLVD TO MARKET ST        0.1 1WAY  4   10,000     700 AM    35   74  B   F  3   2  5  15   850
                MARKET ST TO WILLIAM ST          0.2 1WAY  4   10,000     700 PM    40   66  A   F  3   2  5  11 1,300
                WILLIAM ST TO COURT ST           0.2 1WAY  4   10,000     700 PM    35   66  A   F  3   2  5   7 1,300
                COURT ST TO WASHINGTON ST        0.1 1WAY  4    6,000     950 PM    54   72  A   G  3   3 14  14 1,700

WALNUT STREET   BROAD ST TO ORCHARD ST           0.1 2WAY  4    4,000     250 PM    40   76  A   G  2   1  6   5   500
                ORCHARD TO MULBERRY ST           0.1 2WAY  4    4,000     250 PM    35   67  A   F  1   1  6   5   500
                MULBERRY ST TO MCCARTER          0.1 2WAY  4    5,000     300 PM    35   60  A   F  1   1  6   5   600

WARREN STREET   W.MARKET ST TO LOCK ST           0.4 2WAY  4   16,000   1,100 AM    38   55  A   F  1   1  7   7 1,500
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N E W A R K   T O P I C S   N E T W O R K   S U M M A R Y

STREET NAME	LOCATION	DIST (MI)	DI-REC-TION	FED AID	1975 AWDT	ONE DIR 1975 PEAK HR	WIDTH ROAD	WIDTH R/W	PAVEMENT TYP	PAVEMENT CD	LANES 1-DIR PK	LANES 1-DIR OFF	PARK REG. L	PARK REG. R	LEV C CAP
WARREN STREET	HIGH ST TO WASHINGTON ST	0.2	2WAY	4	3,500	300 PM	35	60	A	P	1	1	4	4	400
	WASHINGTON ST TO HALSEY	0.1	2WAY	4	2,500	200 PM	35	60	A	F	1	1	14	4	300
WASHINGTON PL.	WASHINGTON ST TO HALSEY	0.1	2WAY	4	3,500	200 AM	42	66	A	G	1	1	14	14	300
	HALSEY ST TO BROAD ST	0.1	2WAY	4	7,000	400 AM	42	66	A	G	1	1	2	14	400
WASHINGTON ST	CLINTON AVE TO W.KINNEY	0.3	1WAY	1	12,000	1,100 PM	52	66	A	P	4	3	7	7	2,600
	W.KINNEY ST TO COURT ST	0.2	1WAY	1	18,500	1,200 AM	52	66	A	P	4	3	7	7	2,600
	COURT ST TO HILL ST	0.0	1WAY	1	14,500	1,100 AM	52	66	A	F	4	3	7	7	2,600
	HILL ST TO MARKET ST	0.3	1WAY	1	18,000	1,400 PM	52	66	A	F	4	3	7	7	1,000
	MARKET ST TO WARREN ST	0.2	1WAY	1	16,000	1,400 AM	52	82	A	F	4	3	11	11	2,600
	WARREN ST TO BROAD ST	0.4	1WAY	1	12,000	1,500 PM	52	66	A	F	4	3	11	11	1,300
WILLIAM STREET	BROAD ST TO HALSEY ST	0.1	1WAY	4	7,000	800 PM	33	50	A	F	2	2	16	4	1,000
	HALSEY TO WASHINGTON ST	0.1	1WAY	4	7,000	800 PM	44	62	A	G	3	3	16	4	1,000
	WASHINGTON ST TO HIGH ST	0.2	1WAY	4	4,000	450 PM	30	52	A	F	3	2	16	4	600
W.PARK STREET	HALSEY ST TO BROAD ST	0.1	2WAY	4	3,000	100 PM	30	50	A	P	1	1	4	4	200

TOTAL DISTANCE = 61.0 MILES

FEDERAL AID 1 = 42.4 MILES
FEDERAL AID 2 = 2.6 MILES
FEDERAL AID 4 = 14.3 MILES

APPENDIX B

WARRANTS FOR TRAFFIC SIGNAL INSTALLATION*

Warrant 1 - Minimum Vehicular Volume

Warrant is satisfied when, for each of any 8 hours of an average day, specific minimum traffic volumes exist on the major street and on the higher-volume minor-street approach to the intersection.

Warrant 2 - Interruption of Continuous Traffic

Warrant applies to operating conditions where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or hazard in entering or crossing the major street. In addition to meeting the 8-hour volume requirements it must be shown that other signals on the major street will not sufficiently interrupt traffic to permit side street traffic to move.

Warrant 3 - Minimum Pedestrian Volume

Warrant is satisfied when for each of 8 hours of an average day, specific vehicular and pedestrian volumes are met.

Warrant 4 - School Crossing

Warrant is satisfied at established school crossing when the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period.

Warrant 5 - Progressive Movement

Warrant is satisfied when progressive movement has insufficient vehicle platooning and speed control and when proposed signals are more than 1,000 feet apart.

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*Abridged warrant requirements. The 1971 Manual on Uniform Traffic Control Devices should be consulted for full warrant information.

Warrant 6 - Accident Experience

Warrant is satisfied when 5 or more accidents of a type susceptible to correction by a traffic signal occur per year with injury or damage of more than $100 per accident; less restrictive remedies have failed; the signal will not disrupt progressive flow; and at least 80 percent of vehicular and/or pedestrian volumes stipulated in Warrants 1, 2, or 3 exist.

Warrant 7 - Systems Warrant

Warrant is satisfied when a signal is needed to encourage concentration and organization of traffic flow networks; and when the common intersection of two or more major routes has a total approach volume of 800 or more vehicles per weekday peak hour or each of any five hours of a Saturday and/or Sunday.

Warrant 8 - Combination of Warrants

Warrant is satisfied when two or more of Warrants 1, 2, and 3 are satisfied to the extent of 80 percent or more of the stated values.

APPENDIX B

TABLE OF TRAFFIC SIGNAL WARRANT VOLUMES

No. of Lanes Moving Traffic Each Approach		Warrant 1 Veh./Hr.				Warrant 2 Veh./Hr.			
		A		B		A		B	
Major Street	Minor Street	Major *	Minor *	Major *	Minor *	Major *	Minor *	Major *	Minor *
1	1	500	150	350	105	750	75	525	52
≥ 2	1	600	150	420	105	900	75	630	52
≥ 2	≥ 2	600	200	420	140	900	100	630	70
1	≥ 2	500	200	350	140	750	100	525	70

	Warrant 3			
	A		B	
		4' Wide Median		4' Wide Median
Maj.St. 2 App. Veh./Hr.	600	1000	420	700
High Vol. Xwalk Ped./Hr.	150	150	105	105

Warrants 6 and 8

No. of Lanes Moving Traffic Each Approach		80% Warrant 1 Veh./Hr.				80% Warrant 2 Veh./Hr.			
		A		B		A		B	
Major Street	Minor Street	Major *	Minor *	Major *	Minor *	Major *	Minor *	Major *	Minor *
1	1	400	120	280	84	600	60	420	42
≥ 2	1	480	120	336	84	720	60	504	42
≥ 2	≥ 2	480	160	336	112	720	80	504	56
1	≥ 2	400	160	280	112	600	80	420	56

	80% Warrant 3			
	A		B	
		4' Wide Median		4' Wide Median
Maj.St. 2 App. Veh./Hr.	480	800	336	560
High Vol. Xwalk Ped./Hr.	120	120	84	84

Volume on major street is the total of both approaches; volume on minor street is the higher of either approach.

A— Basic condition.

B— Intersection in the CBD of an isolated community with a population of less than 10,000 or an 85th percentile speed greater than 40 mph on the major street.

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